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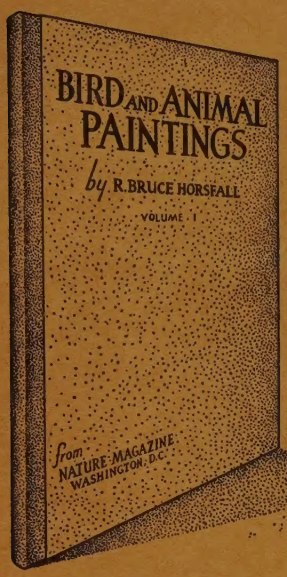

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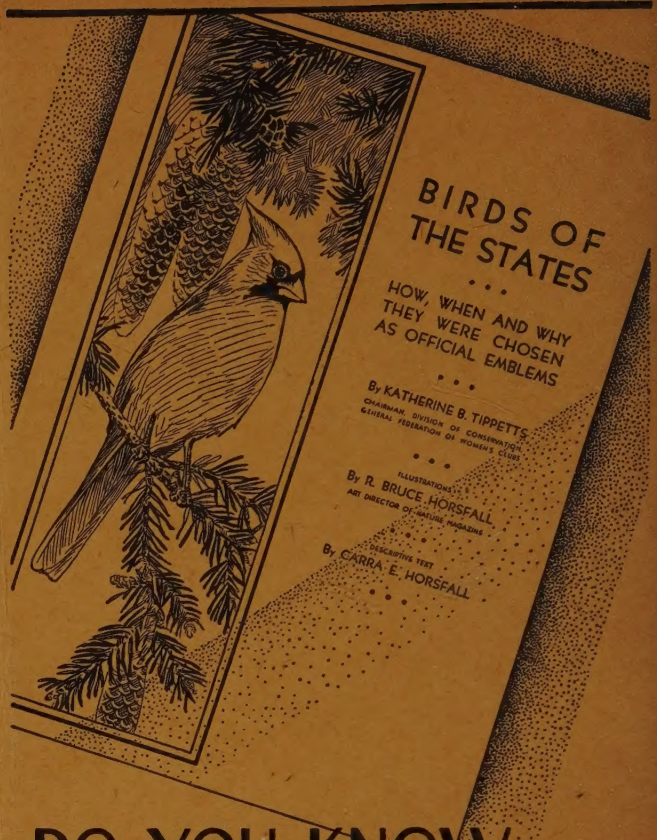
BIRDS OF THE STATES
HOW, WHEN AND WHY THEY WERE CHOSEN AS OFFICIAL EMBLEMS
By KATHERINE B. TIPPETTS
Chairman, Division of Conservation, General Federation of Women's Clubs
Illustrations By R. BRUCE HORSFALL
Art Director of Nature Magazine
Descriptive Text By CARRA E. HORSFALL

DO YOU KNOW The Bird of Your State?

or of the 42 other states that have adopted official birds?

The movement to select an official bird emblem for every state only recently was launched as a nation-wide movement. Some of course had adopted official birds earlier. Altogether, 43 states have now selected a bird to represent them as an emblem.

The fascinating story of how, when and why the various states selected the birds to represent them is told in this book by Katherine B. Tippetts, former Chairman of Conservation, General Federation of Women's Clubs. Illustrating the book are 30 full color paintings of the various birds by R. Bruce Horsfall, the famous wild life painter, with descriptive text by Carra E. Horsfall.

Every home and every school should have this book. It is a fascinating bit of history combined with an authentic and interesting survey of the birds of America. A handy table in the front lists the birds together with the official flowers of the states.

The 16-page book, with 30 illustrations, is offered to readers of Nature Magazine at 25 cents a copy. On orders for ten or more copies, the price is 10 cents a copy.

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Camera Trails

BY NORRIS W. HARKNESS

Farm Animals

Most photographic subject matter offers two distinct kinds of picture opportunities. There is the so-called pictorial picture that has as its principal purpose the creation of an interesting and attractive result that will appeal primarily to the esthetic senses. Most of our photography is usually aimed at such pictures, which include practically all landscapes, seascapes, snow scenes, child shots and other subjects often photographed.

Then there is the record picture, sometimes called documentary and sometimes—and more correctly—historical. It is an effort to record with the camera the details of anything that may need to be studied or described accurately later, and may or may not be made with pictorial principles in mind.

To be sure, many photographs lie in both fields, and often when we undertake one type of shot, we ultimately find that we have produced something that really belongs in the other. Such were the pictures made by Edward Anthony in the early 1840's when he made record pictures to help settle the exact position of the Canadian-Maine boundary. The prints (Daguerreotypes) proved the location of the boundary line, and, at the same time, were excellent as pictorial works.

Farm animals offer both kinds of picture material. Horses straining at their traces make splendid pictures when shot against the light of the setting sun and made from a low camera position. Cows and sheep have long been used to supply life to otherwise empty landscapes. Foals and lambs make good "human interest" pictures, and tiny chicks never fail as picture material. The possibilities of a farm are unlimited for the photographer who uses his imagination and sees what is around him.

But the camera has a more practical value on the farm—especially on a farm that raises stock of any kind for sale or show. The big breeders use photographs as part of their permanent records, and often animals are sold from the pictures. Readers of farm journals know the more or less standard poses used to show horses and cattle, and many of you are familiar with the standards set by the Department of Agriculture for the making of such photographs.

Take a cow, for example. It is photographed from one side, from in front, and from directly above with the camera at right angles to the body except for the "full face" view. The purpose is to show the conformation and markings as clearly as possible, so a plain background is preferable. That is often the wall of a barn, which is sometimes marked off in parallel lines that will show more distinctly the slope of any part of the body. The vertical shot should be made with the animal's head straight and at the angle that will best show the position of the horns, the width of the head and the markings, but more important than these details is the shape of the body. The camera should be directly over the back of the shoulders and far enough above to hold proper proportion. The commercial men usually try to arrange a stand that will keep them ten feet from the animal's back.

Horses are generally shown with their heads stretched out in front of them and the side view is the important one. Have a helper hold the nose rope or a line to the halter to raise his head. Sheep and hogs are usually photographed in the ways suggested for cows, but their side view is far more important than the top or front.

The photographic problems are simple after one has selected the necessary viewpoints. The camera should be as close to the subject as is required to get the largest possible image on the film, and the exposure should be full to give all shadow detail. A filter will almost never be needed. The only tricks involved are those to make the subjects assume and hold the correct poses long enough for the shots to be made.

Any amateur who can make a good straight photograph of real quality can do this type of picture-making, and many of them are finding it a source of income. Try it on those around you. And if you want to commercialize your photography study the markets and the standards of magazines, newspapers and advertisers using picture material.

HUNGRY COW—BY DOROTHY L. NORRIS

Problem Corner

G.L.J., St. Augustine, Florida, says: "I have a number of 16mm Kodachrome movie frames that I want to make into 8 x 10 black and white prints. What procedure is best?"

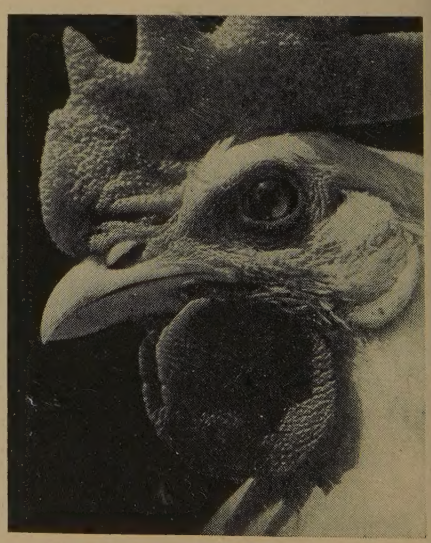
ANS.—The method is to make a negative on panchromatic film by enlargement or contact printing, and to make the prints from this negative. Enlarging the Kodachrome is best since it has no grain, so put the frame in the enlarger with an opaque mask around the picture area to keep all stray light away from the film on which the image is projected. Focus carefully on white paper and then put a Commercial Panchromatic cut film in its place and make the exposure, which will be short. Make the exposure full and develop the film to somewhat less than normal contrast, since the Kodachrome is quite contrasty. The handling of the panchromatic film must be done in complete darkness, and the lighthouse of the enlarger may have to be hooded to reduce stray light that might fog the film. Usually it is best to make the negative as large as your enlarger will accommodate to reduce grain in the final prints. I have made excellent black and whites up to 6 x 9, but larger prints are likely to be something less than satisfying. Similar prints may be made from black and white movie frames using ordinary commercial film in place of the panchromatic, but they are very grainy.

F.D., Edmonton, Alberta, asks: "How can I use a large quantity of enlarging paper that is fogged from old age? It has been stored in a cool place in unopened packages, but my regular development leaves an all-over fog that spoils the prints."

ANS.—A treatment that has worked well for me is to add 90 grains of citric acid to each quart of diluted D-72, diluted with two parts of water to one part of stock solution. About twice the normal exposure is required, but the contrast is nearly normal and the plan seems to hold no troubles. It has worked with paper that had been kept four years beyond the date on the package.

H.T., Louisville, Kentucky, asks: "How can I determine whether my development is correct without any measuring instruments?"

ANS.—The proof of the negative is in the printing, and the negative that prints perfectly for the effect you want on normal paper is properly developed. If you develop at a known temperature for the length of time given in the charts, your negatives should be approximately correct, but something in the water you use or some other factor may affect the results. If you find that several consecutive rolls (developed in fresh solutions) are all under- or over-developed when all the conditions seem right, it means that the developing time needs adjustment. The proof is the grade of paper that is needed for a good print. If each negative needs a harder paper, the development is insufficient, and if soft paper is required, the development should be increased. Standardize your developing temperature and the amount of agitation you give the tank during the time, and then increase the time if hard paper is regularly necessary, or decrease it if you have to resort to the softer grades. Try to adjust the time so that most negatives look best on the number two or normal grade of paper. But remember that changing from one enlarger to another, or using a new kind of



BARNYARD MAJESTY—BY ALAN FISHER

paper, may affect what is for you the perfect development.

This and That

With spring right around the corner, it is time to look for those fascinating pictures of blossoms against the sky. They will be more effective with a dark sky—the kind furnished by a fairly deep filter. A medium yellow will work out all right if the exposure is kept to the minimum, but a deep yellow or orange or red will make the result more dramatic. It is usually best to have the branch run diagonally across the film with its end near one corner of the picture area. But do not forget to include clouds if you can. They add much to the effect. So does a pretty girl, but if you put her into the shot, be sure to have her presence explain itself by something she is doing, like smelling the blossoms or holding the branch for a closer look. If the shot is only a girl and a branch, it will not mean much.

Spring is also a good time to start the year series of the garden that we have talked about. Recently we saw two sets made by the same man. He had completed the first year of his flower garden, and of a swampy pool near his home, and the pictures had a splendid story to tell. The latest development was a request from the natural history teacher in his local high school for copies of the whole series and that he should undertake another that showed many of the wild flowers in the neighborhood. He is also planning to make new and better shots to replace some of those made last year.

Eastman's new Kodacolor film is going to be tremendously popular. We have seen our first four rolls and each is better than the one before. The color negatives look very funny with each color shown in its complementary color. A blonde has greenish hair and blue lips, but she looks grand in the prints. It is faster than Kodachrome and does not need as careful exposure calculations as the older film.

Kodacolor comes in a roll like any black and white film, but it must be returned to Eastman Kodak for development. The color negative is returned to you without prints (the cost of the development is included in the purchase price). If you want prints, you send the negatives back to Eastman through your dealer. They cost 40c each and are slightly less than 3 inches on the short side regardless of the size of the original negative. For example, mine from 2¼ x 2¼ negatives are 2⅞ inches square.

Color prints may be made from the Kodacolor negatives by any process you use for Kodachromes.

The Raygram Corporation, 425 Fourth Avenue, New York, have announced a new permanent protective mounting for Kodachrome transparencies (2 x 2 inches) in the Albert Specialty Company's "Thermo Sealer." The Thermo-Sealer is electrically operated and quickly seals the film without tape or binding between two pieces of glass in a dust- and moisture-proof sandwich. Full information on this and other items in the Raygram line may be obtained by writing the Raygram Corporation at the above address. Please remember to mention NATURE MAGAZINE.

Is there a camera that you do not use any more stuck away on an upper shelf somewhere in the house? If there is, get it down and give your dealer a chance to buy it from you for Defense Stamps, cash, or materials to complete the outfit you are using regularly. The war effort has reduced his stock to the point where he needs that equipment and there is some one on his list who can use and wants it. And save your film spools and other metal film containers and return them to him with that camera. The film manufacturers are short of metal for such purposes and have asked all photographers to return the metal parts for re-use. They have arranged to get the metal from the dealers, so add your supply to the barrel in the dealer's store. It is one way you can help.

Camera Trails is given space in NATURE MAGAZINE to help amateur photographers to get better results and hence more pleasure from their cameras. To that end, Camera Trails conducts a service to help solve the photographic problems that have been troubling you. The editor will also appreciate your suggestions and criticisms of the department, so mail your communications to Norris W. Harkness, Camera Trails, NATURE MAGAZINE, 1214 Sixteenth Street, N.W., Washington, D. C. Questions of general interest will be answered in the Problem Corner as well as directly by mail.

Bird Song Records

Seventy-two bird songs recorded in the wild by the Albert R. Brand Bird Song Foundation are now available in a remarkably fine album of records released by the Comstock Publishing Company, Ithaca, New York. There are six records, each presenting six songs to a side. The birds are grouped geographically or by habitat, the records being Birds of the Northwoods, Birds of Northern Gardens and Shade Trees, Birds of Southern Woods and Gardens, Birds of the Fields and Prairies, North American Game Birds, and Birds of Western North America.

This album is, of course, of particular interest to all bird enthusiasts and should be in every school record library. The recorded songs represent many months of painstaking work in the field, and are the best of many recordings made by the late Albert R. Brand and those who have carried on his work. A few of the songs were earlier available on a Victor record, but in this album they are gathered and organized in a way to make them of the utmost value. Besides the interest that the records afford, they are valuable as an aid in learning to recognize birds by their songs.

This fine album of six discs sells for five dollars. Also individual records are available for one dollar each.

Mammalogists to Meet

The twenty-fourth annual meeting of the American Society of Mammalogists will be held at the American Museum of Natural History in New York from March 31 to April 4. Sessions will be held at the Museum. Henry C. Raven, Edwin H. Colbert and John Eric Hill of the American Museum, and Claude W. Leister of the New York Zoological Park, are the local committee in charge of the arrangements for the meeting.

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PUBLISHED BY THE AMERICAN NATURE ASSOCIATION

To Stimulate Public Interest in Every Phase of Nature and the Out-Of-Doors, and Devoted to the Practical Conservation of the Great Natural Resources of America

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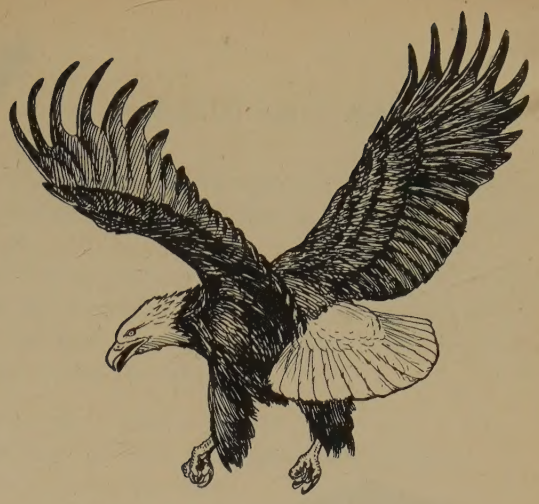

Motion pictures of Nature and the Outdoors will take you far and wide in the world of the wild.

Schools; Garden Clubs; Women's Clubs; Nature and Hiking Clubs; Boy and Girl Scout Troops; Church, Civic and Fraternal Organizations; Sportsman and Conservation Groups will be interested in these motion picture films. Thrilling, educational motion pictures help to boost attendance at meetings. They make meetings more interesting and help to promote some educational activities by increasing a knowledge of Nature and the outdoors; developing a consciousness of the need for practical conservation of our national resources and the protection of wildlife.

FILMING WILDLIFE REQUIRES TIME, PATIENCE AND ENDURANCE

For forty years William L. Finley has been shooting wildlife. But everything he has shot still lives for it was shot with a motion picture camera. More than two hundred thousand feet of film now carry the record of his camera hunting.

The American Nature Association commissioned Dr. Finley to edit eighteen 400-foot reels of 16 millimeter motion picture film, drawing upon the best of his material. Thus 200,000 feet of 35 millimeter film are condensed into the equivalent of 18,000 feet of the best shots of all.

These interesting, entertaining and educational films are grouped as follows:

GROUP I: Specially adapted for school use and for juvenile audiences.

11. *Babes in the Woods:* The life of Nature's young in the wild.
12. *Wild Animal Pets:* A naturalist's dog into whose life came many strange animals.
13. *Renting Houses for Songs:* An intimate study of bird life.

GROUP II: A spectacular series of Alaskan reels.

21. *Cruising North:* Murres, sea puffins, bear and other coastal wildlife.
22. *Off to Glacier Bay:* Spectacular pictures of the face of a glacier breaking off and plunging into the bay. Also wildlife scenes.
23. *Wild Animal Outposts:* Hardy Island deer, ptarmigan, bear cubs, blue fox, fur seals of the Pribilofs.
24. *Thar She Blows:* Whales at sea.
25. *Great Bear of Alaska:* Films of the great Kodiak bears of Admiralty Island.

GROUP III: Southwestern series.

31. *Wings to the South:* Bird life of the Texas Gulf coast and the southwest.
32. *Riding the Rimrock:* Searching the rough country of the southwest for its wildlife.
33. *Nature's Side Show:* The struggle for existence in the arid southwest.
34. *Queer Creatures of the Cactus Country:* A study in the adaptation of wildlife to a harsh land.
35. *Getting Personal with Mountain Lions:* A thrilling picture of a pack trip into lion country.

GROUP IV: Photographed along the Continental Divide.

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42. *The Forests:* Forest Fires, Birds, Beaver—greatest conservationist of all—at work.
43. *When Mountains Call:* The life of the high places is thrilling to see. Water Ouzel, Ptarmigan, American Eagle, Big Horn Sheep, Wapiti—American cousin of the European Stag.
44. *Ramparts of the North:* Filming big game requires endurance. Glaciers, Hoary Marmot, Caribou, Moose, Black Bear.
45. *Getting Our Goat:* Mountain Goat on its native crags. Ground Squirrels, Cony, Grouse.

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Nature in Print

By HOWARD ZAHNISER

A BOOK CLUB has recently been successfully organized on the expectation that a forgotten book may have as good a chance for security as that held out a few years ago to the forgotten man. With the courageous prospectus of this club fresh in memory, I feel somewhat inspired to become an advocate myself, believing with Milton, as well as the composers of brochures, that a good book is "treasured up for a life beyond life." Going even further than the conceivers of this newest of clubs, I am resolved not only to observe an occasional remembrance of books past but also to practice a preventive vigilance in behalf of books present that may seem destined to reach too few readers.

What these books may be from time to time I shall leave in part to those readers and personal counsellors who can supplement my own browsings and the current advices of publishers—folks like Ed Ballard of the National Parks Association, for example, who recently called to attention an excellent volume of verses called *Flashing Wings,* by William Plumer Fowler. Published in 1941 at $1.50 by Bruce Humphries, Inc., of Boston, Massachusetts, this 91-page volume of sonnets and other lyrics has apparently not been noticed by many readers, and yet I am sure that those who have seen it, or may yet, will be glad that as far as they are concerned *Flashing Wings* is not among the unseen books of the day. Mr. Fowler's poetic voice is a new one among the chorus that we have known, and still expect, from the literary region of New England. Only a few of his poems have been published in periodicals, all having comparatively small circulations, and *Flashing Wings* is his first collection. It is a book that I hope may readily attract readers. Some of the poems will be well remembered, but many are of the kind that provide inspiration and enjoyment for an evening and then are laid aside. These latter poems are the kind that are too often ignored when volumes of verse are first published, and unfortunately so because they are not likely to be called to attention later. Once missed, they are likely to be gone forever and their benefits forever missed.

We are too serious with poetry for our own enjoyment. Novels, short stories, books of travel, essays, and other kinds of prose we are perfectly well satisfied to read for an evening's entertainment without first convincing ourselves that the volume at hand is a classic of the ages. With poetry it is different. Our standards, especially for Nature poetry, are high, and we seem reluctant to take in hand a new volume of verse unless the publisher or some reviewer has first assured us that it will stay on the shelves beside library editions of William Wordsworth or Robert Frost.

As a result we seldom sit down to refresh or entertain ourselves with new poetry. We muster up such a high moral purpose or artistic resolve that we end up by admiring our poets but not sincerely liking their poetry very much. We miss a lot of enjoyment, ignore the opportunity to share the excitement and observations of beauty of our contemporaries who like to fashion their writings into verse, and discourage our own poets from later publishing other volumes that might indeed be great poetry by any standards.

It takes many poets to make a literature, and it would be well for us to place a value upon all of them whose work is gathered into volumes. As Mr. Fowler says in a few verses called "Glimpses:"

> Although to poets it is given
> To show on Earth some glimpse of Heaven—
> Yet no one poet ever can
> Depict the whole of Heaven to Man,
> Nor can we ever hope to see
> All Heaven in one anthology.

The glimpses that he himself shows in *Flashing Wings* have their locale for the most part along the seacoast of New Hampshire or in the mountains and other outdoor places of that State. Most of his poems are sonnets with such titles as "March", "Marsh Marigolds", "Little River Marsh", "December Sunrise", "The Snowstorm", and "A Poet's Cat." Others are lyrics or free-verse descriptions of scenes along the seacoast and of characters who have intrigued the poet. A few, like "Winston Churchill" and "Awake, America!—1940", are of timely interest. All, unlike many modern verses, conform to Mr. Fowler's belief "In Re Poetry" that

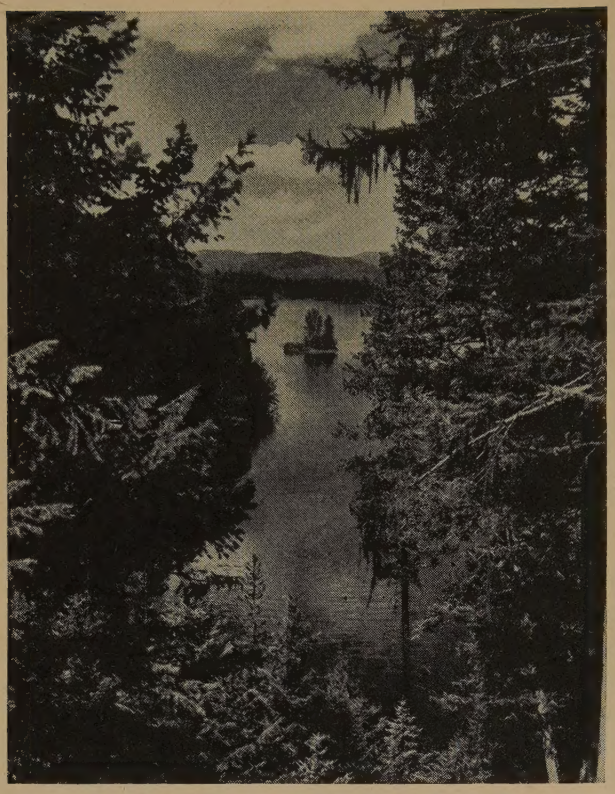
> The most effective poetry
> Is grounded in simplicity
> And eloquent with brevity.

Flashing Wings would, I am sure, bring refreshment, enjoyment, and interest to many readers, as it did in my home one evening—readers who will be thankful to Mr. Ballard for bringing it to mind.

Across the continent from Mr. Fowler's New Hampshire, Mr. H. J. Parham of Penticton, British Columbia, has a library of books that might well be distributed over the intervening continent—books published in London some five years ago but now apparently among those forgotten books whose advocate I have become. Like the library of which Henry David Thoreau boasted, most of these books are the owner's own writings, all the volumes in fact that are pertinent to this discussion being entitled *A Nature Lover in British Columbia,* by H. J. Parham.

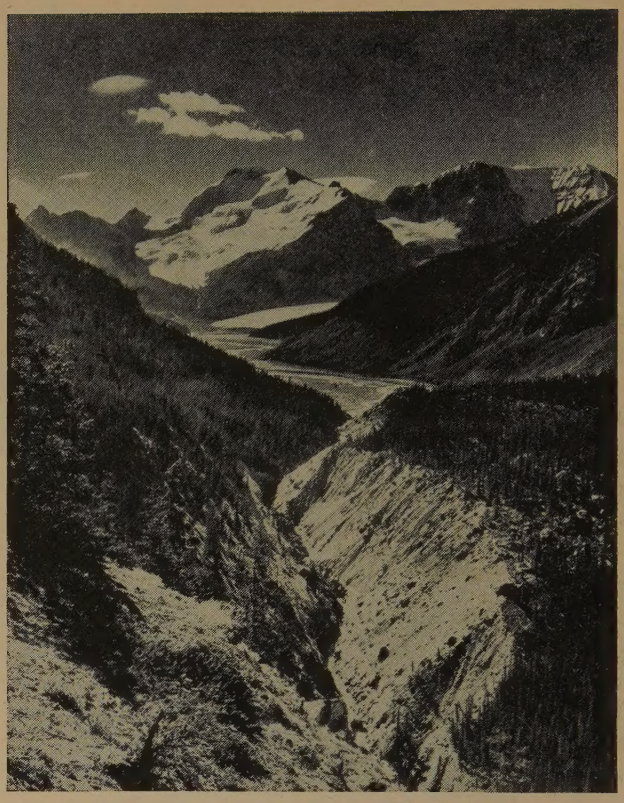
"In reply to your question as to the price and where the book is obtainable," writes Mr. Parham from Penticton, "I would say that all copies are now in my hands here, the price is $2.50."

This simple statement of fact tells bluntly of one of those near-tragedies in the realm of books. Fortunately for me one of those copies of *A Nature Lover in British Columbia* is now in my hands, and it is my hope that similar good fortune will come to other readers. Thus would be averted in one good case the tragic accident that occurs when a valuable work fails to meet its readers promptly and then is stored—unhonored, (Continued on page 218)



LOWER THOMPSON LAKE IN NORTHWEST MONTANA

An enchanted isle, glimpsed through an evergreen vista, seems to lift leafy sails to the breeze and come cruising down the lake. This is a region known to white men since the early 1800's, when David Thompson, geographer of the Northwest Company, surveyed it. Photograph by John Lindsey Blackford

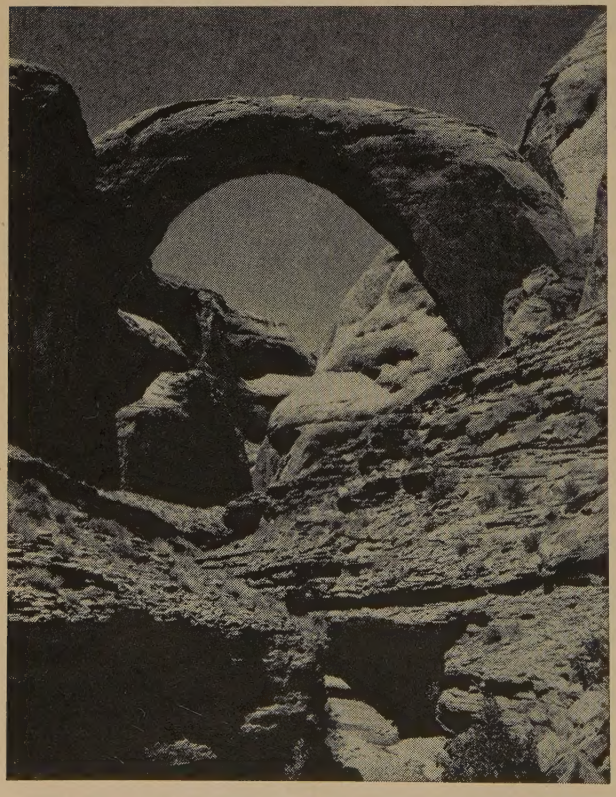


SUNWAPTA RIVER CANYON IN JASPER PARK

Grinding down from the rolling white plain of the Columbia Icefield, Athabaska Glacier thaws to form the reckless, tawny Sunwapta. Here the "river of the whirlpool" plunges into its precipitous canyon; the tongue of the glacier is beyond and Mount Athabaska rises above it. Photograph by Blackford

RAINBOW NATURAL BRIDGE IN UTAH

Preserved as a National Monument and in a country that is difficult of access, Rainbow Bridge seems to be guarded by Nature from over-exploitation. Each year more and more people are making the rough trip to gaze upon the striking beauty of the great natural arch. Photograph by Josef Muench



A SAGUARO FRAMES A PICTURE OF ITS FELLOWS

An arm of a giant cactus provides an arch through which to view others. These largest of the cactuses are preserved in a National Monument in Utah. They develop slowly and reproduce sparingly, sending out a widespread root system to glean moisture in a region where water is very scarce. Photograph by Muench

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EDWIN BRIDGE IN NATURAL BRIDGES NATIONAL MONUMENT IN UTAH

Washed out of the sandstone through the ages that have passed, this is one of three arches within the boundaries of the reservation. Forty horsemen could line their mounts side by side on the arch above the chasm. Photograph by Josef Muench

America's green pastures and still waters; mountains and forests are—

WORTH FIGHTING FOR

By RICHARD W. WESTWOOD

BREATHING heavily from the climb, we pulled ourselves over the last rocky shelf to the summit of Gunsight Mountain. Below, to the south, lay Lake Ellen Wilson, a drop of emerald in a bowl of mountains. Northward Sperry Glacier spread its ancient icy tentacles. To the west Lake McDonald changed from blue to steel gray as a mass of cloud slipped between it and the sun. In all directions stretched peak after peak; snow-dressed from a fresh fall the night before; glistening in the sun's rays.

The little doctor slipped his camera case from his shoulder; reached into a pocket for his tobacco pouch. He drew out an empty envelope, frayed and crumpled.

"Funny thing, isn't it?" he said, almost to himself. "Been carrying this around five days, with all outdoors around me and no place to throw it away."

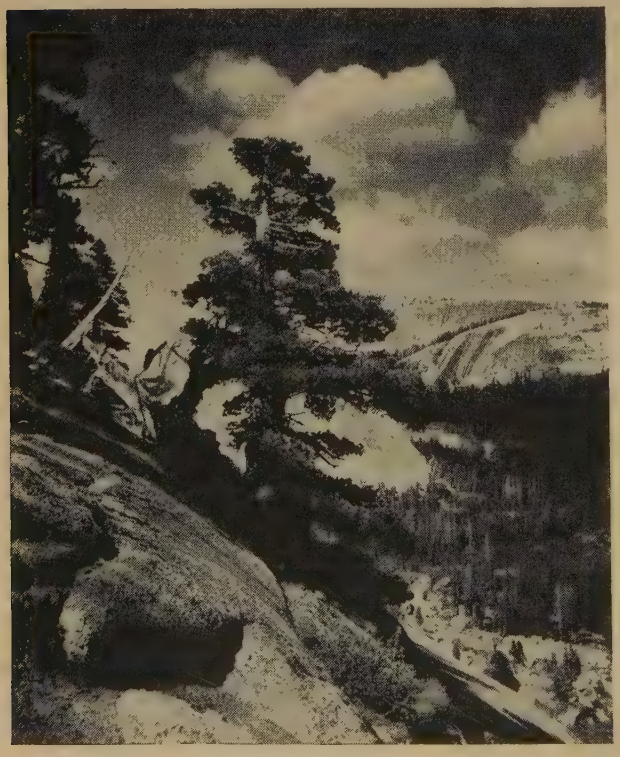
He stuffed it back in his pocket and fished on the other

HUMBUG MOUNTAIN STATE PARK ON OREGON'S COAST

Many are the unforgettable scenes of our Pacific shores. In this park, south of Cape Bianco, powerful "nor'westers" dwarf the lodgepole pines, usually tall and slender, and give them habit and form of uncommon beauty. Heavy fogs and frequent rains with mild winter temperatures prevail in this region. Photograph by John Lindsey Blackford

TIOGA PASS IN THE HIGH SIERRAS OF YOSEMITE

Above Tenya Lake in the Yosemite National Park, alpine climbers gain a memorable view of barren domes and boulder-strewn glacial landscapes so characteristic of this region. To the left Tioga Pass, a 9941-foot gray granite gateway, leads down to the curious Mono Craters. Sierra rosy finches reside in this zone. Photograph by John Lindsey Blackford



side for his pouch. To the rest of us there seemed nothing humorous about his remark. All this vastness of glacier and lake, mountain peak and forest was *ours*. It was Glacier National Park—one of the great areas that are spread out from Acadia, in Maine, to Kings Canyon in California, from the Great Smokies of North Carolina and Tennessee to Jasper in Alberta, that the people of the United States and Canada have set aside for present and future generations. Wilfully desecrating it, even to tossing aside a bit of waste paper, seemed as wrong as knocking out the smouldering heel of a pipe on the living room rug—or the floor of a forest.

As we sat on that mountain top, letting the jagged majesty of the scene seep into us, we were at peace—and so was the world. Any menace to our safety or to these mountains seemed remote. We had then no thought that covetous eyes would be turned toward our land; that the awesome grandeur of the Grand Canyon, the soft smoky beauty of the Blue Ridge, the tumbling cascade of Yellowstone Falls, the sublime beauty of Lake Louise, or the snow-wrapped integrity of Mount Rainier, would be any more in danger than New York or San Francisco, Galveston or Bangor. The threat of war was unthinkable.

PEYTO LAKE AND THE MISTAYA RIVER VALLEY, BANFF

Deep within the vast spruce forests of Banff National Park, Canada, marvelously beautiful Peyto Lake lies at the farthest source of the Mistaya. Mystically blue, chill with the icy melt-water of great glaciers, it empties into the Saskatchewan—into the fabled land of Indian, trapper, trader and the Royal Mounted. Photograph by John Lindsey Blackford

BLACK CANYON OF THE GUNNISON IN COLORADO

Far below in the black depths of this awesome canyon, now preserved as a National Monument, may be seen the Gunnison River as it sweeps between its dark, embracing cliffs. The power of the stream in ages past is graphically shown by the depth of the canyon and by the extreme age of the rock that forms its walls. Photograph by Josef Muench

Yet today they all are threatened—city, forest, and park; canyon, lake and river. The forces of evil aggression want what we have.

It is not unnatural, of course, that totalitarian minds should be jealous of the wealth of the Americas. But they have taken on an order too large for them to fill. They have brought into war against them a people who know what they have and have no intention of letting anyone take it from them. Millions of Americans and Canadians have visited one or more of the great national scenic reservations of both countries. We know that this is our property established for our benefit and enjoyment; preserved for those who will follow us. We know that these areas are incomparable. We know that they are worth fighting for. We will fight for them—and successfully.

These areas are, then, a symbol of the democratic, American way of life. Also, in time of war, perhaps more even than in time of peace, they are immensely important for their contribution to morale. A people at war must retain as much of normalcy as possible. The human nervous system cannot long survive day after day, twenty-four hours a day, war talk, war thought and war effort. There must be relaxation. Americans are not noted, even in

"COKE OVENS" IN COLORADO NATIONAL MONUMENT

Sandstone erosions, these formations are seen from the road into the area. They are in one of the several canyons that make up this region. Photograph by Josef Muench

normal times, for this ability. Yet it is a habit that we must cultivate under stress. Park, forest and wilderness, with their atmosphere of tranquility, provide this release better than anything else.

Canada has recognized this necessity from the very start. Last year 966,800 Canadians and 203,800 Americans visited the parks of the Dominion. Canadian park authorities point out that this provided healthful recreation, and proved the parks to be a real factor in the war economy of Canada. And they are quite frank in adding that the money spent by Americans was helpful in aiding their war purchases from across the border.

Started in 1885, when fifty-nine square miles around hot mineral springs at Banff were set aside, the Dominion park system has grown to 29,000 square miles comprised in seventeen parks. They extend from mountain parks in British Columbia, through Jasper, Banff and Waterton Lakes, include prairie parks in Alberta and Saskatchewan, extend eastward through the Ontario parks to Prince Edward Island and Cape Breton Highlands parks in the East. All are wildlife sanctuaries, and all offer a wide variety of recreation.

On our side of the border, starting with the creation of Yellowstone National Park in 1872, there are now 164 parks, monuments and other areas under the National Park Service, embracing 33,765 square miles. Of these the Director of the Service, in his annual report to the Secretary of the Interior, says:

"An informal poll of park visitors conducted by the park rangers, naturalists, historians and others in direct touch with the visiting public during the past year shows that the national parks are considered by our citizens to play a predominant role in inspiring pride in our American heritage."

Rumors were current for a time that the parks would be closed during 1942. No such thing is contemplated, and if it were it would be ridiculous. It is probable that travel to the distant parks will be less this year, at least so far as automobile travel is concerned. Figures show that ninety-three per cent of the normal travel to the parks is by automobile. And the tires on the family car are going to be regarded with unusual tenderness and solicitude for the duration. Furthermore, estimates show that only fifty per cent of the automobiles now running have tires that will last more than twelve or fifteen months of use.

In view of the tire situation, and other restrictions affecting the motoring public, railroad travel to these recreational areas is in for a

DEVIL'S POSTPILE IN EAST-CENTRAL CALIFORNIA

It consists of peculiar hexagonal basaltic columns like an immense pile of posts, and is suggestive of the Giant's Causeway in Ireland. Photograph by Josef Muench

ORGAN PIPE CACTUS NATIONAL MONUMENT IN ARIZONA

Against a background of desert mountains we see silvery palo verde and this strange cactus. A finely-balanced desert life exists in this area. Photograph by Josef Muench

sharp increase in 1942. And the sturdy trail horses should enjoy a new popularity during the coming season. Many people will learn that a western saddle atop a trail-wise equine provides a mighty fine place to spend a vacation, despite a few cramps in the knees at the end of the trail. A bit of stiffness in the legs is, in fact, much to be desired over a nervous breakdown.

Just how increased living costs and taxes will affect the vacation plans of Americans is a matter of conjecture. Despite these factors, more people have more money than has been the case since the "roof fell in" in 1929. More people are going to need relaxation and to be able to get it when they can spare the time.

National Parks are, in a sense, symbolic of the outdoor recreational facilities Americans have created. They are outstanding areas, usually large. They meet the highest standards scenically, and preserve regions that unwise exploitation would otherwise ruin. But the national parks are not the only areas by any means. The national forests, administered by the U. S. Forest Service, in the majority of which recreational areas have been set aside, are vitally important. In many cities close to such reservations people are able to lease, at low cost, cabin and camp sites and thus escape quickly from factory and office to the quiet and peace of the wild. Forest wilderness areas beckon hikers and campers who want to take their outdoors in really rough form.

In addition to the national parks, the National Park Service administers many national monuments, and numerous historical sites. Many of the states have created state park systems, particularly those states that have no national parks or forests. These will enjoy heavy use in 1942.

"Blood, sweat and sacrifice" are, through no wish of ours, the order of the day. Americans have one major task —the winning of this war. They have all the tools for the job, but the basic tool is the individual human being. He or she must be fit, mentally and physically. He or she must have the strength to make the sacrifices and expend the effort necessary to the successful conduct of the fight behind the lines.

This strength we may find in the green pastures and beside the still waters. It is to Nature that the Lord leads those that are beset, that they may find restoration of the soul. Americans are fortunate in their green pastures and still waters; their mountains and forests. For them they will fight, and, because of them, they will win.

DEATH VALLEY NATIONAL MONUMENT, CALIFORNIA

Looking from Dante's View in the Black Mountains toward the Panamints. White alkali colors the salt beds in the valley below. Photograph by Josef Muench

Many interesting legends, growing through the years, make up the—

Nature Lore of Easter

Illustrations by the Author

By PAUL PIM

TO US in the northern half of the world Easter is truly a resurrection time. Every bud and bursting blossom has its message of cheer and assurance: "There is no death."

Common Easter symbols today are the lily, the palm, the rabbit, and brightly-colored eggs. Many ancient peoples regarded the egg as an emblem of life. The Christians made it emblematic of the Resurrection. The custom of dyeing Easter eggs is centuries old. We dye Easter eggs in many bright colors but the early Christians used but one color in their Easter day offerings, and that red, in allusion to the life blood shed on the cross.

Since the moon decides when Easter shall come, and since many people see a rabbit instead of a man in the moon our Easter rabbits may have originated from this idea. However, ancient pagan peoples considered the rabbit both as a symbol of fertility and a representative of the moon-goddess Luna. Luna was worshipped annually at a time coinciding with the Easter festival, so the early Christians may have adopted the rabbit along with many other pagan rites and symbols.

At any rate, both the rabbit and the egg, as symbols of fecundity and new birth, figured in the spring festivals of the early peoples of northern Europe, who thus welcomed the return of the season of new life and abundance. The still closer association of eggs and rabbit is said to have been brought to America by the Dutch, and to date from the accidental starting of a hare close to some colored eggs that had been hidden for the children to find, to hearten them in a year when a famine threatened. "See the beautiful eggs that the hare has laid for us," said a happy child, and ever since the two have been closely bonded in the minds of young children.

The peacock, now considered an emblem of pride, was once a popular symbol of immortality. Legend said that the flesh of this bird never decayed and also added a symbolic interpretation of the yearly molting, by which the faded feathers were renewed in all their beauty.

The lion, too, by an odd superstition, was a favored symbol of the Resurrection. According to the old story, lion cubs were born dead and were brought to life after three days by the roaring of their father.

Other emblems of immortality are the phoenix and the eagle. The mythical phoenix, according to legend, every six hundred years, when old, tired and faded, would build itself a nest of spices and sweet gums in the top of a mighty tree. Then it would fan it into flames with its wings. When the nest and bird had been consumed the phoenix would arise from the ashes to another life, gorgeous as before.

The eagle when old and weary was said to have flown into the heart of the sun. After its body was consumed a resurrection took place, and the eagle returned to its crag full of vigor and new life.

The early Christians painted the story of Jonah on the walls of the catacombs at Rome to symbolize death and the Resurrection. The early Greek philosophers saw the transformation of the ugly caterpillar and dormant chrysalis into a beautiful butterfly as a symbol of the soul and immortality. They represented Psyche, the soul, sometimes as a winged maiden, but often as a butterfly alone. The early Christians adopted this symbol of the winged soul unchanged.

The scarab beetle, relatives of which are found all over

the world—an example being our familiar tumble-bug—was worshipped by the old Egyptians as an emblem of fertility and the Resurrection. If you know the curious ways of our tumble-bug or dung beetle, which is a close relative of the Egyptian *Scarabaeus sacer,* you can see how this symbolic idea arose. The beetle lays an egg in a ball of dung, which it makes carefully and surprisingly round, rolling the ball by pushing it with its hind legs, thus trundling it for considerable distances, and finally burying it. The interior of the ball furnishes food upon which the young beetle lives before it emerges into the world of sunlight and shadow to make its way.

The ancient Egyptians were very superstitious, and their scarab, set in a ring, seal, or other personal ornament, was used as an amulet. Many of the Egyptian carved or engraved scarabs were very beautiful.

Domestic fowls had become common in Palestine at the time of Jesus, having been brought years before from Persia. According to the New Testament story, the crowing of a cock ushered in the tragedy that ended in the crucifixion of Jesus of Nazareth.

According to folklore and legend many birds have been connected in one way or another with Christ's crucifixion. Tradition tells us that the robin redbreast picked a thorn from the crown when Christ was on the way to Calvary. The blood that issued from the wound dyed its breast with red. This is the robin redbreast of Europe, *Erithacus rubecula,* and not our common North American robin. This mythical story is widespread in northern Europe.

Another tradition says that the common or corn bunting, *Emberiza miliaria,* fluttered about the cross and the stains of blood crimsoned its plumage. In punishment its eggs ever after were doomed to be spotted with red. It is a common bird of Europe and Asia.

In Swedish legend, the stork, *Ciconia alba,* is a sacred bird, and received its name from its flying around the cross of the crucified Redeemer crying "Stryka! stryka!" (strengthen! strengthen!). A Scandinavian tradition has it that the swallow hovered over the cross of our Lord crying "Svala! svala!" (cheer up! cheer up!) hence it was called "svalow", the bird of consolation. The common swallow, *Hirundo rustica,* in summer ranges all over Europe and most of Asia. Several species of swallow inhabit the Holy Land, such as the Oriental swallow, *Hirundo cahirica,* and the rufous swallow, *Hirundo rufula.*

The Spaniards have a legend that swallows—two thousand of them—are the birds that pulled the thorns from Christ's crown. They also have a legend that the owl was once one of the sweetest of singers, but having been present when Jesus died, forever afterwards shunned daylight and now only repeats in a harsh tone "Cruz! cruz!"

The Swedes also have a tradition concerning their red crossbill, *Loxia curvirostra,* that its peculiarly crossed beak became twisted in its effort to pull the nails from Christ's hands and feet. Great Britain has a legend that the red-browed goldfinch of Europe, *Carduelis carduelis,* performed the same loving service.

A Russian legend has it that the sparrow, *Passer domesticus,* while Christ was hanging on the cross, was maliciously chirping "Jif! jif!" that is "He is living! He is living!" in order to urge the tormentors to fresh cruelties. Therefore the sparrow is under a curse, and ever since that time it hops, because its legs are tied together by invisible bonds, for its sin. Notice how the English sparrow hops the next time you see one.

There are many legends of flowers, trees and plants in connection with the crucifixion of Jesus. Along our roadsides in midsummer we notice the slender purple spikes of the blue vervain, *Verbena hastata.* It is often called "simpler's joy", a name borrowed from *Verbena officinalis,* a plant native to Europe and Asia. No plant that the herb-gatherer or simpler could find was more salable than vervain; hence none brought more joy to the simple peasant. Pliny wrote that no plant was more honored among the Romans than the sacred *Verbena.* Folklore says it was first found growing on the Mount of Calvary and it was worn on the person to avoid disaster. It was also thought to stimulate affection, and to be able to break the power of witches.

There are about sixty species of small trees and shrubs called dogwood and found chiefly in north temperate regions. Flowering dogwood, our *Cornus florida,* is best known in the United States. An old folklore story says that at the time of the crucifixion the dogwood attained the size of the oak and other forest trees. As the wood was

so strong and fine it was chosen for the timber of the cross. To be used for such a purpose greatly distressed the tree and Jesus sensed this and made the tree a promise, "Never again shall the dogwood tree grow large enough to be used for a Cross, henceforth it shall be slender and bent and twisted and its blossoms shall be in the form of a cross and in the center of the outer edge of each petal there shall be nail prints brown with rust and stained with blood."

Cyclamen, often seen as a pot plant in America, abounds in the Holy Land. "Cock of the mountain," the Arabs call it. It has a strange flower with bent back, curved petals, and a crimson eye looking down. Tradition has dedicated this flower to the Virgin because the sorrow that pierced her heart is symbolized in the blood drop at the heart of the flower. Wild cyclamen, *Cyclamen umbratile,* is known in Europe as sow-bread because swine relish its tubers.

The scarlet anemone of Palestine, a relative of our wood anemone, *Anemone nemorosa,* is called "blood-drops-of-Christ" because legend says that the sacred blood fell upon the anemones that were growing on Calvary on the evening of the Crucifixion.

In parts of Europe the anemone is known as the Easter flower or the flower of the Resurrection. The old Germans called it the "cow bell" because they used it to make garlands for the cows during their Easter festivals.

The Madonna lily, *Lilium candidum,* has come down in history as a symbol of purity. The old Greeks and Romans called it the Rose of Juno and said it must be formed of celestial milk as nothing else could account for its gleaming whiteness. It was adopted by the early Christians as the Resurrection flower and as such is the Easter lily. They wove delightful legends about it.

When Mary, Mother of Jesus, died at the age of seventy-three, her tomb was found to be filled with lilies after the Ascension. This miracle was accomplished to allay the doubts of St. Thomas who could not be persuaded that the Virgin had really risen from the dead. As he stood beside her lily-filled tomb he saw her hovering in the air above it, and when she flung her girdle to him he was forced to believe.

The Madonna lily grows wild in southern Europe and is hardy enough to thrive in the gardens of America. It was long used as the Easter lily, but often its flowers failed to appear in time for Easter, so its place has been taken by the Bermuda lily, *Lilium longiflorum.*

According to legend, Veronica was a pious woman of Jerusalem, who gave Jesus her handkerchief to wipe the drops of blood and sweat from His brow while on His way to Calvary. After using the handkerchief He handed it back with His face miraculously impressed upon it. This was a Vera ikonika, or true image, whence Veronica. Legend says that blood also dropped on the flowers Veronica was wearing and that they also received the sacred image. As the flowers are thought to show a human face like that on her handkerchief they took her name. So today you find in botanies a token of this story in the Latin name the botanists give to speedwell, *Veronica.*

The genus speedwell contains about 250 species, temperate, alpine and arctic, many of which are shrubs or trees with handsome spikes or flowers, and often cultivated. Some fifteen species of speedwell occur in North America, including several that have been naturalized from the Old World. Culver's root, *Veronica virginica,* was formerly much used in medicine.

In Austria it is believed that Christ's crown of torture was fashioned from hawthorn and blackthorn. Others say that it was from acacia or shittim wood. The shittah tree of the Bible is thought to be *Acacia seyal.* In common language the term acacia is often applied to species of the genus *Robinia.* Our common or yellow locust, *Robinia pseudo-acacia,* belongs to this group. Another member of this great pea family found in America is *Cercis canadensis,* the redbud or Judas tree. According to legend, the color of the blossoms of the Judas tree tells how the tree burned with shame when Judas hanged himself upon it. Another legend says the crown was made of holly.

According to folklore the purple of the jack-in-the-pulpit or Indian turnip, *Arisaema triphyllum,* marks where the blood of the crucified fell in the hour of agony.

The old Italian masters frequently painted the cattail, *Typha latifola,* as a mock scepter in the hand of the Master, in their pictures of the crowning of Christ with thorns. Other legends respecting the Crucifixion are indicated in the monkish declaration that the red poppy contains a divine revelation because it bears the cross in its center; and in the custom of cutting bananas lengthwise in the Canary Islands, because when cut across they show the symbol of the Crucifixion.

An old Spanish tradition says the passion flower climbed the cross and fastened about the scars in the wood where the nails had been driven through the hands and feet of the Saviour. The name passion flower arose from the supposed resemblance of the corona to the crown of thorns and of the other parts of the flower to the nails or wounds, while the five sepals and five petals were supposed to symbolize the ten Apostles—Peter, who denied, and Judas, who betrayed, being left out of the reckoning. Some early religions saw in the corona the halo; to some of them the five stamens were the five wounds, while to others they represented the hammers used to drive the nails, symbolized by the three-knobbed styles.

When the Spanish explorers found the flower growing in the jungles of South America they regarded it as a token that the Indians should be converted to Christianity. The plant of the common passion flower or maypop, *Passiflora incarnata,* of the southern United States is shrubby and climbing, and is somewhat troublesome in the cotton fields.

When Christ was praying in Gethsemane on the night before the Crucifixion He was disturbed by the crackling and sawing of the plant we know as dyer's broom, or woadwaxen *Genista tinctoria.* It continued its noise until Christ was taken by the group with Judas at their head. Turning to the broom, according to tradition, Christ said, "May you always burn with as (Continued on page 217)

BLACK TERN CHICK ON ITS REEDY NEST
This youngster of the watery places will soon learn to make its own way in the natural habitat of its kind

The drama of youth is found in woodland, lake and marsh among the—

Babes of the Wild

Photographs by the Author

By JOHN LINDSEY BLACKFORD

EVERY YEAR, in the wilderness, in field, and in hedgerow, is re-lived a dramatic story—the young of the wild learning the ways of their hazardous world. With their first day of life the babes of birdland begin their lessons. For them and their small four-footed classmates there can be no recess or vacation; Nature's school never closes its doors.

A bit of airy down darted away from me one day along a stony lake shore. So swiftly did it move, so difficult was it to discern among the gray-brown boulders, that only a close, scrambling pursuit prevented it from vanishing utterly. Turning toward the margin, after it had failed to secrete itself among the rocks, the fluffy babe of the beach splashed out into the water unhesitatingly, and before I could reach it paddled energetically beyond arm's length. It seemed that if one were to catch up with the tiny stilt-legged spotted sandpiper, clothes would have to come off, and wading would be unavoidable. Yet, whenever I drew back, the sand-peep edged in close to the strand, and never did he risk himself many feet out on the swelling surface of the great lake. So I took advantage of his overweening love of the pebbled shore, and the downy mite, seeing his pursuer leaving, rode up on the narrow fringe of wet sand. Hurriedly I dashed back over the rocks and grasped him before deep water again separated us. Cupping hands and making bars of my fingers, I held the tiny, struggling, gray elflet close to my face.

Soon I heard the plaintive *peet-weet, peet-teet* of an anxious parent teetering along the marge, seeking to lure me into pursuit. With an answering *peet* my little animated puffball sought unceasingly to escape. Freedom had been born a part of him. His disproportionately long blue-gray legs pried and pushed against my palms, his miniature bill thrust into every finger-crack. From each attempt to

OBEYING INSTINCT AND ITS MOTHER'S ORDERS, THE FAWN DOES NOT MOVE

The author was able to cut away concealing limbs and grasses, and even to pick the baby up and change its position without its slightest protest. Note the youngster's protective coloration

pose him for a picture the beach baby squirmed loose and raced away. The exasperating, half-handful of down never tired. When finally released he was still all kick, pry and wrestle. Although but a tiny, first-grade pupil, he had learned his early lessons well. Instinctively he sensed the call of the shimmering shingle shore, the dulcet lisp of the waves, and the heave of the far dark swell where the parent "tip-ups" skimmed in bent bows of flight. He knew too that in the sweet haunting *peet-teet, peet-weet,* coming persistently from the wave-wash down the shore, all these things called longingly to him again.

In the wild, adventure often becomes misadventure. Survival is the reward of those that learn, and babes must learn not only well but quickly. Discipline is thoroughly understood by fathers and mothers, both furred and feathered, and children that lag in their lessons soon realize its import also.

A timorous young trumpeter swan on Red Rock Lakes was on several occasions observed to refuse to try his wings, and not all the coaxing of the older birds succeeded in persuading him to the effort. Two other cygnets of the family were apt pupils, marking the example of their elegant parents and heeding the latters' cries of admonition and encouragement. Soon they were rising on snowy pinions and beating across the surface of the shallow lower lake. But the indifferent youngster persisted in his obstinate course. At last both older trumpeters were seen to rush upon him. They struck and buffeted the laggard and drove him before them over the water. To escape he was obliged to employ his untried wings manfully, and before long was vying with the others in this new and exciting, yet momentous game of flight.

Few infants are more winsome, more elf-like and precocial in their obedience than those of the ruffed grouse. It is always a temptation to share with their courageous mother the fondling of these wildwood elves. Even the young of the "fool hen" appear to show less of the confiding curiosity and misplaced friendliness that has won the adult birds their uncomplimentary name. A female Franklin's grouse was crossing the road when I came upon her, one warm, indolent afternoon, and I followed until she clambered up on a moss-cushioned log. With a low cluck she delayed there almost within reach. Concluding I was harmless she hopped to the ground and bustled past no farther than a step away, returning directly to the lodgepoles at the upper end of a shady draw. There I quickly discovered her mate and family. The cock ruffled his black and mottled plumage and raised the reddish combs over his eyes—his utmost at defense or fight. Nearby perched a not overly-prepossessing youngster,

UNFLEDGED SPOTTED SANDPIPER CHICK

Although only a mite, it took to the water for safety but seemed to know enough not to venture too far from shore

just making the change from down to ridiculous pin feathers. The little wood grouse displayed a higher intelligence quotient than either parent. He was disturbed at my coming, walked up and down on his jackpine bough, and stretched out his scrawny little neck. On my closer approach he erected the several dubious feathers that provided him with a crest. Soon he chittered small warning notes, and took off for a safer spot in the needled depths. This babe of the woods did not need to be taught the age-old precaution of suspecting every other living thing. He would have to grow up to become foolish.

One morning on the wide grassland between two marshes, I saw a young sandhill crane striding toward me through the tall, waving stems. The youthful adventurer was alone. He possessed courage, if not caution, and continued to advance as I waited for him. Nearer, he circled at a few paces and went on toward the farther fen. The slate-gray of his feathering was overlaid and varied with brown. Juvenile fuzz lingered on head and neck. Four feet high, he would have been regarded as an odd looking youngster by any but his own admiring kin.

Determined to observe him further, I followed and was obliged to break into a run. He raced ahead awkwardly on long stilt legs while I slogged after in water-filled rubber boots. I was winded when at last he swerved and faced me, raising stubby wings and menacing me with a formidable bill. This was a fine show of audacity, but he was ready to desert it for another brief flight. Again he swung around and advanced a few steps to disguise his trepidation, making a short pass or two with his "rapier". Now the marsh fledgling executed a curious bow, bending over until his beak touched the turf. This ludicrous maneuver was fortified by a snake-like hiss, repeated several times as he backed away. I watched him stalk off through the belt-high grasses, a comically grotesque student of the school of the wild. He had yet to learn the rule of avoiding trouble, but already the young crane had acquired the courage and tactics for meeting it when it came.

A nest of the varying hare was discovered at the base of an old water birch in April. In it were four little "snowshoes", miniature editions of the older "swamp-jacks". They were so small and young as they huddled together that only once did they attempt to escape as I took their picture. However, a few hours later, I returned and found the hollow empty. Judging from other mites of similar size seen abroad in the brush country, I think it an actual leave-taking rather than maternal vigilance that took them from their lately-discovered nook. Beset by so many lurking dangers these tiny hares, who begin life in the open instead of in a burrow, must ever be ready while yet infants to fend largely for themselves. Some wilderness children are better equipped at the start for their first lessons in self-preservation.

THE MOTHER VIREO BRINGS BREAKFAST

The smaller birds are more dependent for a longer time than the larger species and thus less able to avoid danger

YOUNG RUFFED GROUSE ON GUARD

There is a wary and questioning look in the bird's bright eye and every indication of readiness to put up the good fight

For others, lesson time does not seriously begin until after a period of complete helplessness has been outgrown. In that interval of infancy life is precarious. No more than a whim of weather may decide their fortunes, or the keen eyes of an enemy may follow a parent bringing them food.

Death takes sinister form in seeking the babes of woodland, lake, and marsh. One day the frantic cries of a junco mother brought aid to the distressed bird, but not wholly in time. Of her four nestlings whose cradle had been deftly concealed beneath ground juniper and wild rose, one could be traced by the swelling evident on the sinuous body of a garter snake. Another was so far advanced toward the same fate that it did not survive. After the reptile had been dispatched, the remaining junco juniors seemed relatively secure. Yet a nest once disturbed frequently suffers further molestation. This seems particularly true wherever human interference has disclosed its presence, and such an event so often precedes just such avian tragedies. Thus the junco home was apparently marked in some intangible way. By the next morning the last two unfeathered nestlings had disappeared.

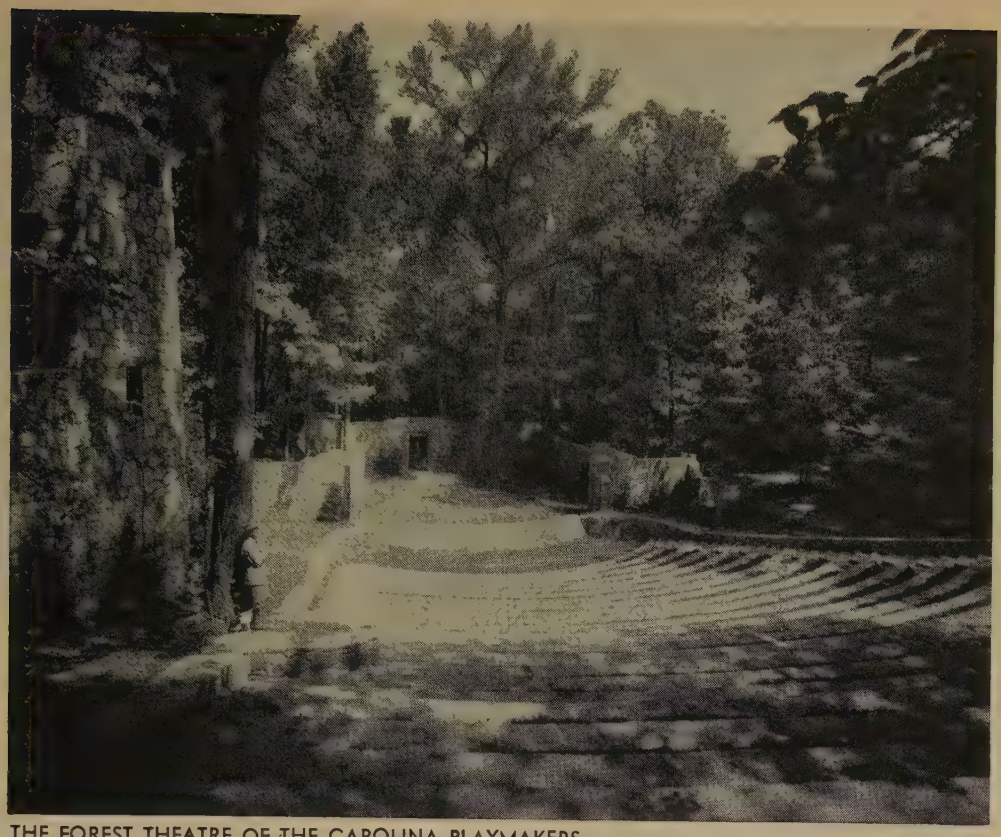
Nowhere in the wild are we likely to find the lesson of obedience better illustrated than by the behavior of a young fawn. In obeying the wise doe who subtly secretes him while she forages, the youngster receives his first instruction in concealment and "freezing", as well as poise in the face of danger. I was tramping through the sunny pinelands in June when accidentally I stumbled upon a spotted white-tail only a few days old. He was so perfectly concealed by the shifting lights and shadows, blending with his tawny, dotted coat, by the bending grasses and the broad, tossing leaves of balsam root hanging over him that I should have passed unknowing at a few feet.

He did not betray either surprise or panic, or attempt escape. Faithful in this crisis to instinct and parental teaching, he made no slightest move. Only his regular breathing was perceptible. As quietly as possible I withdrew, walked a mile and a half for a camera, and returned to find the youngster in exactly the same spot and position. Only his mother's coming, or some wholly undisguised menace, would cause him to betray his presence.

How true this was soon became evident. Commencing with the waving grasses that leaned above him and which would blur the photographs, I cleared away obstructions. Made bold by successfully breaking short an offending pine twig and bending back the broad leaves of balsam root, I finished by cutting away with jackknife wild oat heads nodding beside his delicate nostrils, the fawn's breath warm upon my nervous fingers. Pictures were taken from several angles, and then others from directly over him. The sun blazed hotly or swift clouds passed cool, transient shadows over us. Occasionally he opened liquid eyes, tinged with the milky blue of infancy. But he never stirred. After making certain of the first negatives, I hoped for some different pose. Yet the little fawn remained obedient to the whispered cautionings of instinct and parental warning. Perhaps he had by now lost his first fear of me as well. At any rate I lifted him in my arms without difficulty and turned him around, facing the furtive sunlight. The fawn raised his head alertly and then flattened against the ground. I tried to recapture the pose for the camera. Finally, picking him up, I placed him gently as I had found him—just as the doe left him when with a high bound and whistled snort she signaled my first approach a hundred yards away. During that long hour she had given no further sign of her nearness. She knew her babe would obey. And even in such trying circumstances he did not fail.

Sometimes, for no apparent reason, wild things forget their lessons in caution; then they lose an almost everpresent awareness to danger and display a surprising confidence where man is concerned. Yet I had never supposed that I might lay hand over a roving pine siskin when afield, and be pecked for my pains!

In later August, near an old log barn on the fringe of the pineland, I hoped to see some pale goldfinches that frequented the spot for wild sunflower gone to seed. Instead, a flight of northern siskins were picnicking among the tall weeds. They showed the busy interest in foraging and that sweet friendliness that is so characteristically the linnet's. I came quite close before most of the flock forsook breakfasting and winged up into the conifers, dulcet *see—eeps* and *see-a-wees* giving airy enchantment to their temporarily interrupted meal. (Continued on page 221)



THE FOREST THEATRE OF THE CAROLINA PLAYMAKERS
Through the subtle witchery of changing moods it casts a spell upon the spirit and the senses. It has few rivals. Photograph by Wootten-Moulton

Nature has been lavish in her gifts to the University at—

CHAPEL HILL

By MAUD MACDONALD HUTCHESON

WHAT'S in a name? The question has always been provocative, leaving so much choice in answer. Some names, however, are picture-words, like Chapel Hill, which pictures a chapel on a hilltop. In the 1700's it stood on high ground where two main roads met and crossed—the one marking the trail between Fayetteville and Richmond, and the other stretching from the North Carolina coast to the western part of the State.

The University of North Carolina, first State University in the nation, inherited this crossroads site in 1792, and from this nucleus has expanded to a 500-acre campus with sixty-six academic buildings. Shops and houses complete a charming college town, whose "business section" is confined to one long block that serves the university community.

Thus Chapel Hill means the University *and* its environs. It overlooks the surrounding country from a proud elevation of five hundred and one feet. Acres of greensward stretch between the buildings, "the long green glory of the grass" shadowed by ancient trees. The white oaks are of a rare magnificence, and the Davie Poplar, named for the father of the University, ranks with North Carolina's famous trees. Under its shade was held the committee meeting at which the site of the University was selected in November, 1792.

Southern foliage with its lush profusion of bloom and color makes an exquisite frame for the buildings—many of which are graced by domes and pillars.

But Chapel Hill's loveliness is not limited to the external scene. A sense of peace overlies its wooded setting. Every now and then the brooding stillness is broken by a bell, tolling the hour, but the disturbance is sweet even in echo.

Nature's green fingers have full scope to work magic at Chapel Hill. The University has a Forest Theatre, an Herbarium and an "Arboretum", which might better be called a Garden, in each of which it takes quiet pride. Less than forty years ago the Arboretum was a bit of meadow waste, but through the vision of Dr. W. C. Coker it has been transformed into a sanctuary for man and Na-

ON THE CAMPUS

Ancient trees shade the old well, traditional meeting place. South Building is the central portion of the campus, housing the administrative offices

ture alike, a fitting combination.

The Herbarium is the largest in the South, now containing about 90,000 specimens. According to the dictionary the word means "a book, case or room to hold a collection of dried plants." The Herbarium is a bona fide *plant library,* where specimens may be studied and borrowed like books.

And The Forest Theatre has few rivals. Through the subtle witchery of changing moods it casts a spell upon the spirit and the senses, bringing to the audience a grateful feeling of peace and contentment.

Altering character with the play of light and shade, it is magnificent at mid-day, when players and audience are "sun-lighted" in a golden glow, and the hum of many voices makes a musical undertone.

But the fading dusk shows The Forest Theatre in a mood mystically different. At this darkling hour, deserted by performers and spectators, it is enveloped by a weird woodland silence that echoes to a chorus of bird calls and unfamiliar sounds. If a soft spring rain happens to be falling, everything glistens in the half-light. The trees drip with diamonds, the grass has an iridescent gleam, the wet fieldstone is streaked with garnet and pearl, and even the damp earth is warm with color.

The Forest Theatre at Chapel Hill was rebuilt last year with the aid of a $20,000 grant from WPA. Made of stone from North Carolina's native hills, the new structure was formally opened on May 23, 1941, when Professor Frederick H. Koch, distinguished head of the drama department, rededicated "our Theatre of the Forest and ourselves to man's continuing search for Beauty . . . and his ceaseless quest for song . . ."

For more than twenty years the Theatre had simply been a sloping hillside where the audience sat on the grass and looked down towards a make-shift stage. Now, seating is provided for 1000 spectators by wide grass-grown terraces that descend in graceful stone tiers.

The bona fide stage, fifty by thirty feet, is dignified by a curved proscenium, the sides and rear of which are screened by two low walls, and "backstage", which means behind this stone protection, are two "tiring houses" or dressing rooms for the players.

Into the making of the graceful proscenium wall went the patient skill of "Old Tobe" Henderson, a beloved character, long and well known for the devotion and skill that he gave to his homely tasks, but now gone.

When the Theatre was being shaped from the hillside Professor Koch one day asked Old Tobe if he realized that this wall would be his monument—that as the years went on thousands of people would admire and enjoy it.

"I guess that's right," said Old Tobe, "I'll make it the best wall I ever made." And this his monument, the work of his own hands, is a thing of enduring beauty.

The orchestra pit can do double duty. It forms a lower stage level, on which the street scenes, in *Romeo and Juliet,* for instance, are set.

From the vantage point of

IN THE ARBORETUM

". . . it is an enchanted garden-kingdom where nothing disturbs the illusion of space or the comfort of solitude." It was reclaimed from a swampy area. Photograph by Bayard Wootten

two stone towers, placed picturesquely half way up the slope, the lighting equipment is handled, while at the top of the hill, facing the stage, are the director's station and the control board.

The University Forest, which Nature has provided for a backdrop, is magnificent in its own right. The site was "discovered" by W. C. Coker and Edwin Grunlaw of the Botany and English Departments.

It is fitting that Chapel Hill should have been dowered with this exquisite woodland playhouse, when such a notable contribution to the nation's dramatic history has been made by the University of North Carolina.

Its brilliant graduate, Paul Green—playwright, author, philosopher and Pulitzer Prize winner—has, in the past few years, directed his talents to the creation of drama depicting epochal periods in the history of the nation. His magnificent symphonic pageants, the *Lost Colony* and the *Highland Call,* "suggest new horizons in the making of an American people's theatre," says Professor Koch, for in them are united "all the arts—spectacle, music and dancing, in a tapestry of poetry." They represent a new adventure, that of communal playmaking.

Only five wooded acres make up Chapel Hill's "Arboretum", yet it is an enchanted garden-kingdom where nothing disturbs the illusion of space or the comfort of solitude.

Brown sanded paths, arbored with bloom at flowering time, beckon down long vistas that lead to sylvan glades and woodland dells. Trees, shrubs and flowers are arranged with careless art, to illustrate their best use in design and planting. Tiny streams thread a winding course and murmur happily among banks of ferns and wild flowers. Rustic bridges, overhung with shade, give suddenly upon a spacious clearing, walled by luxuriant growth.

The place is beloved of birds and shy animal life, for among five hundred varieties of trees and plants there is food at all seasons as well as a good nesting choice.

Chapel Hill's "Arboretum" is a tribute to the vision of Dr. Coker, Professor of Botany, who has reclaimed it from a bit of waste land used for a cow pasture. It was given to him less than forty years ago, with an appropriation of ten dollars and the assistance of one Negro. There was considerable scoffing over the idea that he could make anything out of swamp, but now it is recognized as one of the most beautiful of the country's gardens. Although designated by the trustees as the "Coker Arboretum", according to Dr. Coker it is rather a garden or ornamental grounds. The soil is such that, even after much sub-tile draining, it is still unfitted for many trees and shrubs, including some of the North Carolina natives.

Even in winter the Arboretum is vivid with the beauty of varied greens and colored berries. Dr. Coker is specially interested in the hollies, and a large variety of these divide honors with firs, cedars, pine, English yews and evergreens.

Blossom time begins as early as January, with first-breath-of-spring. Hard on its heels comes the forsythia, showering gold, as it were, from the dark earth. Magnolia, dogwood, honeysuckle, wisteria and roses follow in quick succession and the flowering of hawthorns dresses the trees in pink and white magnificence.

Among the less familiar trees are North Carolina yellowwood, whose wood furnishes a yellow dye; the fever tree from Florida, the bark of which contains quinine; the black haw and the blue haw; the bold and proud cypresses of our coastal swamps; the incense cedar of the Pacific Coast; deodars or Himalayan cedars from India—the word means "divine tree"—and the varnish tree and cherry blossoms from Japan.

The Herbarium or plant library is housed in the Botany building near the Arboretum. Preparing plants for this unique institution is a process involving time and care. When the specimen is brought in from the field, notes are made on its characteristics, its surroundings and associates. Its habitat is also of first importance—that is, whether grown on marsh or bog land, granite cliff or other terrain.

The next step is the pressing, which may be done in the field or in the Herbarium workroom. To absorb all moisture the plant or flower is placed within sheets of thin paper, and is laid between large blotters and dried flat, either under a weight or in the electric drier.

Treatment with various poisons follows, to prevent insects from eating the specimens. The flower parts of plants are particularly toothsome!

A permanent label is then prepared, containing all relevant data, and the specimen is arranged artistically on special mounting paper. Each sheet is given a catalog number and the Herbarium seal is affixed. There is thus no danger of confusion when the sheets are borrowed.

The filing is done under a system of "family groups." Each genus has its own folder, the specific titles being alphabetically arranged. The finished specimens are kept on shelves in large cupboards, with glass doors.

Cherishing its rich heritage of tradition, Chapel Hill is a leading ally of progress. The University of North Carolina has been in the van of educational enterprise for a century and a half, and its high standards of teaching and scholarship are everywhere recognized as outstanding.

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TO A BIRD SINGING

By WADE VAN DORE

Wild one, uttering spring, I could rejoice
Like you, and I could sing as loud and clear,
But while you sing in this impassioned voice
I must be still. . . .

THE PHOTO-CELL AND THE PHOTO-ELECTRIC CELL OF THE COUNTER MECHANISM WITH THE COVER REMOVED

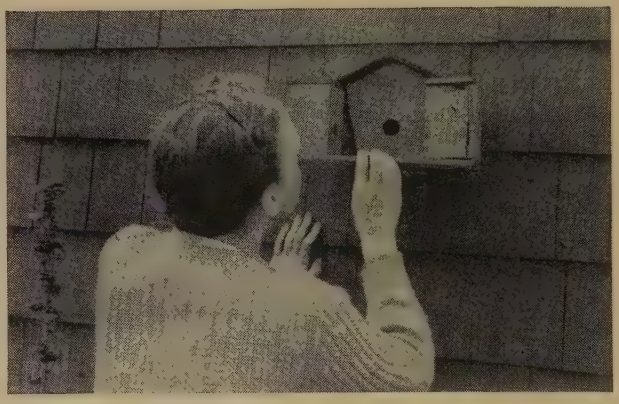
THE YOUNG STUDENT OF BIRDS LISTENS IN ON THE CONVERSATION IN THE WREN HOUSE

Counting the Bird-House Visits

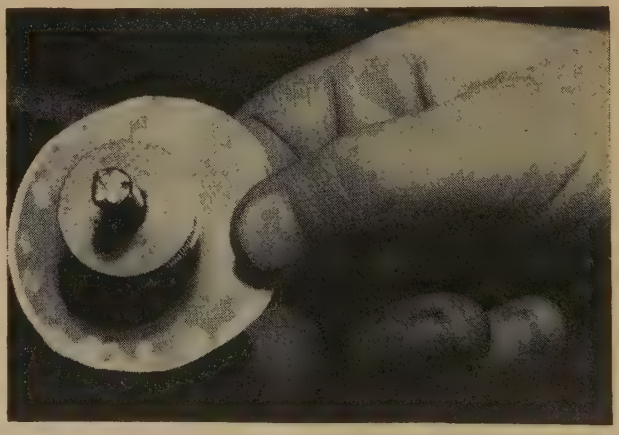
By RAYMOND F. YATES

An amateur ornithologist of western New York has invaded the privacy of a wren's nest with scientific gadgets that not only tally mother wren's exits and returns but also amplify and carry the twittering of her and her young over wires to the exterior of a nearby home. There the children of the household listen in on the busy feathered family.

It was first desired to know how many trips a wren might make daily while she was feeding a brood. Hence, a photo-electric cell with a suitable six-volt lamp was installed and concealed in such a manner that the wren had to cut the beam on each trip she made for food. This interruption operated a relay connected with an electrically-actuated counter. It was found, curiously enough, that the bird made more trips while she was moving in and preparing her nest than she made while she was faced with the feeding of her young. After the young were born, she averaged forty-seven trips daily, while she made fifty-two during the preparation of her home.



THE SCIENTIFIC HOUSE MOUNTED AND READY FOR ITS OCCUPANT, AND (BELOW) THE SENSITIVE MICROPHONE THAT IS SECRETED WITHIN THE WREN HOUSE



The microphone is concealed in the bird house and is extremely small although highly sensitive. When the amplifier is connected with a loudspeaker, the wren family becomes surprisingly noisy. Eavesdropping humans, of course, had to be content to speculate as to what sort of remarks the parent birds made to each other. Certainly, however, there was conversation a plenty in the wren family mansion.

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SPRING

By MAREL BROWN

The earth is a chest
And in its hidden corners
Nature now reaches
Her slender fingers to find
A green satin coverlet.

Let's Pray for the Preying Birds

BALD EAGLE

The nineteenth in Nature Magazine's series of educational inserts

By E. LAURENCE PALMER

Illustrated by Hope Sawyer

OSPREY

SOME years ago, I attended a meeting of sportsmen where a collection of various birds of prey was displayed, completely surrounded by a great variety of hunting and fishing equipment. The man in charge explained that the equipment was for prizes to the sportsmen killing the greatest numbers of hawks and owls in a local "vermin" campaign. I asked if the hunters were advised to kill all hawks and owls and was told that only the harmful species would count in the scoring, the dead useful birds being discarded.

Pursuing the subject, I asked the man in charge of the contest which birds of prey he considered harmful and which useful among those displayed before us. He pointed to a beautiful, huge, gray bird as one of the most useful—a goshawk, whose record may be seen in the accompanying charts. Asked which was a harmful species, he immediately pointed to a bird that the taxidermist showed attacking a pheasant. It was a species protected by law in the State. Yet, this man had set himself up as the arbiter of the fate of some of the most wonderful feathered creatures of his environment.

RED-TAILED HAWK

A few years later a Seattle paper gave display to a picture of an owl that had been shot near a game farm where the attendant said it was an enemy of the pheasants. It was a barn owl, killed by a state game official in a state that protects the species by law. I examined its stomach and it contained not a feather, but was full of the bones and fur of small mammals mostly injurious to man's interests. Our preying birds need our prayers.

MARSH HAWK

There are probably few groups of living things about which convictions are more set than the birds of prey. For generations, some farm families have been passing down the idea that the only good hawk is a dead one. For thousands of years men have trained hawks for falconry.

In the light of history, then, this article should summarize what the birds of prey should mean to the poet, the artist, the sportsman, the farmer, the fisherman, the student of biology, the student of folklore, the aviator, the lawyer, the minister, geographer, librarian and the Nature lover. These constitute a reasonable cross-section of our public in opinion and influence that should be unified to assure justice to our hawks.

Shakespeare, among the poets, mentions both hawks and owls. He even measures the love for a woman against the love some men have for their horses and falcons, with—

"Thy love is better than high birth to me—
Of more delight than hawks and horses be."

GOSHAWK

Scott, for all his gallantry, is not so complimentary to the ladies when he compares the apparent content of a captive peregrine with a dynamic dame. He says:

"We hold our falcon on our glove
But where shall we find leash or band
For dame that loves to rove."

Rupert Brooke in "The Great Lover" names "eagles" and "crying flames" as symbolizing the importance of certain things that he had learned to love, and now must leave.

Louis Fuertes, one of the greatest of our bird artists, loved the duck hawk above all other species. A hawk is often used by artists to break the monotony of an open sky, and a dead tree stub is rarely pictured without a perching hawk or eagle.

COOPER'S HAWK

SHARP-SHINNED HAWK

Architects use eagles and other birds of prey as emblems of victory and of power. Those who design coins and stamps frequently use eagles, possibly as emblems of authority.

Probably the sportsman, fisherman and farmer take a more vigorous stand in their dealings with birds of prey than do most other citizens. For the most part, if they do not like something, they do their best to kill it; the guns of these people injure more birds than do the words of the poets or the brushes of the artists.

In this discussion we must distinguish between the sportsman and the hunter. If we must make a distinction, we would have to consider the hunter as the man who kills without mercy, and the sportsman as the man who, on paper at least, gives the target a sporting chance.

Much has been written about the use of old-world hawks in falconry, and lately there has been a revived interest in this sport. One crack-pot proposal is for the capture and training of a thousand duck hawks that are to be trained to attack invading parachutists. Such a project would lead to nothing but the destruction of most of the nesting sites of these glorious birds.

A number of proverbs have used falconry as a theme. Among these, we find such expressions as: "Pride, like hooded hawks in darkness, soars"; "Hold fast, the first point in hawking"; and "With empty hand, no man should hawks allure."

The sportsmen and the hunters also differ on how hawks should be treated in the field. Aldo Leopold, in his *Game Management,* advocates the killing of hawks and owls only under the most carefully controlled and selective conditions.

Some states, such as Pennsylvania, where hawks have been killed under a bounty system, have found it so expensive and ineffective that they have for the most part either abandoned it or so reduced the bounty that it offers little inducement to hunters who might shoot for financial profit. These same hunters are now in no small numbers trooping with the Nature lovers to Hawk Mountain Sanctuary merely to experience the joy that goes with observing a "hawk flight" in a protected area.

DUCK HAWK

Bounty systems, coupled with the more voluntary "vermin campaigns" engaged in by the hunters and stimulated by the powder companies, defeat their purpose in a number of ways. Eaton's studies in New Jersey in 1931 showed that when the conspicuous hawks were shot off, their places were taken by the less conspicuous but usually more destructive types. In six years, the larger, more useful species of hawks in that state decreased 54 percent. At the same time the more destructive species increased 14 percent.

In spite of all the evidence collected through unbiased studies by the Federal government and by volunteer workers, powerful groups still press for destruction of birds of prey. Surely *they* are the enemies of wildlife and of a sound agriculture more than are the birds they seek to destroy.

RED-SHOULDERED HAWK

SPARROW HAWK

Many of our hunters sanction a philosophy that calls for heavy shooting of species suffering from epizootics. The idea is that such a practice will eliminate the weak and permit the survivors to start with a clean slate. These are often the same people who would kill our birds of prey. Yet the birds of prey serve as excellent natural destroyers of the weak and of the cripples—victims of poor marksmanship on the part of the hunters. The birds of prey are more selective than the defenders of "heavy shooting" and, if there is anything to the philosophy, the birds of prey do exactly what these gunmen advocate, but do it more intelligently.

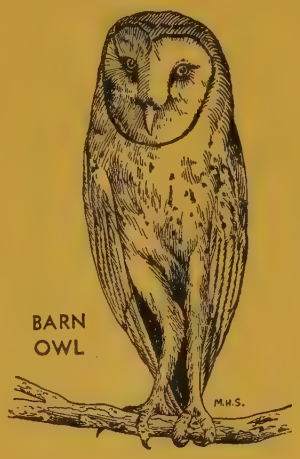
One might think that the closest relation between farmers and hawks and owls is the appetite of some birds of prey for chickens.

Actually the important relation lies in the appetite of hawks and owls for mice and rats, the arch enemies of almost everything the farmer tries to raise. A swift glance through the food habits of these birds in the charts in this insert should convince anyone of their value in checking the multiplication of injurious mice.

Some species of hawks are of positive help to chicken farmers. An osprey, for example, will never kill chickens. It will not permit other species of hawks to nest in the territory it establishes as its home area. As a result, the osprey nest is a guarantee against hawk chicken killers.

The osprey also is involved in relationships between fishermen and birds of prey. This relationship can hardly be better expressed than in Alexander Wilson's "The Fisherman's Hymn", which runs:

"She rears her young on yonder tree;
She leaves her faithful mate to mind 'em;
Like us, for fish she sails to sea,
And, plunging, shows us where to find 'em.
Yo, yo, my hearts! let's seek the deep,
Ply every oar, and cheerly wish her,
While the slow bending net we sweep,
God bless the fish-hawk and the fisher."



But the osprey has even more to hold our interest. Its weak cry sounds ridiculous from a bird of its size, but when we see one make a plunge for a meal, we watch breathlessly. There are authentic stories of ospreys being drowned by being dragged under water by a fish too large to be lifted.

After a bird has risked its life for a meal, it seems unfair that it might be forced to give it up by a larger bird. And yet this is what often happens when the osprey's territory is also within the domain of the larger and more powerful eagle. Those who have seen an eagle take a fish from an osprey cherish the experience.

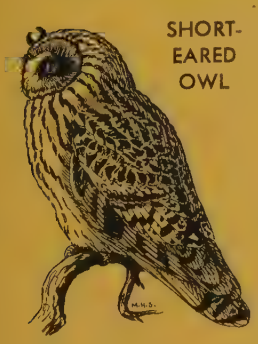
For the most part, however, eagles are scavengers that feed on dead fish found along the shore. Most of the studies of the bald eagle emphasize this role of the bird. Selection of the eagle as our national bird must have been made because of its appearance in flight, but, whatever the reason, it is fortunate that it has protection. Even with this support, the range and numbers of the bird are probably being lessened and there are and probably always will be powerful influences directed at continuing that limitation. When an eagle, or many eagles, are seen feeding on decaying salmon and the salmon "run" continues to drop from year to year, it is easy for some people to contend that the presence of the eagle is the cause of the decreased size in the run. Such logic overlooks entirely other influences such as overfishing by man. Laws have been passed to protect these birds but they must be enforced by an informed public opinion as well as by official police power.

The legal profession has obligations in connection with birds of prey. There are national laws that deal with some of these birds and state laws that deal with others. A species that may be protected in one state may not be in an adjacent state into which it may migrate, and some of these birds migrate even between nations.

State's rights are all right, but state law makers are not equally well informed the country over. The Biological Survey and its successor the Fish and Wildlife Service for years collected data on the food habits of these birds. This information should be used to evolve a national and an international policy with regional modifications to fit different situations. This should call for united efforts of the legal profession and of the professional biologist.

If the lawyer has difficulty in applying laws to birds of prey, the clergyman has an even more difficult task in defining what his attitude should be towards the birds if he takes his *Bible* literally. In Leviticus, II, we find a rather general indictment of many birds of this group, most of which were declared to be unclean, and unfit for food, and "an abomination."

We find a more appreciative attitude towards hawks later in the *Bible*. In Job, we find the spirit of God directing the migrations of hawks when we read: "Doth the hawk fly by thy wisdom or stretch her wings towards the south?" When we read this, we know that some ancient must have witnessed, appreciated and marvelled at some autumn "hawk flight." The high and rapid (Concluded on p. 200)



COMMON NAME SCIENTIFIC NAME ORDER FAMILY	BALD EAGLE *Haliaeetus leucocephalus* Order Falconiformes. Family Accipitriidae.	RED-TAILED HAWK *Buteo borealis* Order Falconiformes. Family Accipitriidae.	RED-SHOULDERED HAWK *Buteo lineatus* Order Falconiformes. Family Accipitriidae.	MARSH HAWK *Circus hudsonius* Order Falconiformes. Family Accipitriidae.
DESCRIPTION	Male, length, 34 inches; wing-spread, 85 inches. Female, length, 37 inches; wing-spread, 90 inches. Weight, to 11.5 pounds. Female, larger than male; young, often larger than adults, nearly black, without white head, neck and tail, which is characteristic of the adult. Conspicuously white and brownish black.	Length, to 2 feet; wing-spread, to 56 inches. Weight, to 4 pounds. Heavy appearing, with broad wings. Tail of adult, red above and little rounded. Dusky gray above, with lighter wings; yellow white, beneath. Band across belly, brown-streaked. Appears less uniformly colored from beneath than red-shouldered. Male, smaller than female.	Length, 23 inches; wing-spread, 44 inches; tail, 9.7 inches. Female, often larger than the male. Weight, to 3 pounds. Gray brown, with reddish brown underparts. Reddish shoulder feathers, and tail with 4 or 5 cross bars. Appears uniform from beneath but shows a white spot just behind a dark streak, near wing-tips. Young streaked beneath.	Male, length, 20 inches; wing-spread, 45 inches. Weight, 1 pound. Female, length, 24 inches; wing-spread, 54 inches. Weight, 21 ounces. Adult male, light blue-gray back, with black wing-tips, conspicuous white rump, high wing angle, and long tail and wings. Adult female and immature, brown above; beneath, buff, streaked with brown.
CLASSIFICATION AND RANGE	Range of two subspecies: breeds through Alaska to Ungava and south to British Columbia and the Great Lakes. Winters, south to Washington and Connecticut. Southern subspecies winters and breeds through United States, to southern Lower California and central Mexico. Known from Pleistocene.	Breeds from southeastern Canada through United States to northeastern Mexico in the plains, merging with western species which ranges through United States and north to tree line in Canada. Winters, from Kansas to New York and south through eastern Mexico; occasional, in England. Known from Pleistocene of Florida and California.	Breeds from Nova Scotia to Prince Edward Island and south almost to Gulf of Mexico, with other close relatives extending range into Mexico. Winters in above range and on into Mexico. Usually seen soaring high and slowly, or on some conspicuous high perch near the open.	Breeds, from northeastern Siberia to Prince Edward Island, south to northern Lower California, and to Florida. Winters southern British Columbia and southern New England south to Florida, Cuba and Colombia. Also in Hawaii and the Barbados. Known from Oregon and California Pleistocene.
LIFE HISTORY	Courting male loops in air before female and chases her. Nest, huge pile of sticks, added to each year, in tall tree or on high ledge. Eggs, 3 to 4, buff white, with brown and cinnamon spots, 2.12 by 1.16 inches. Incubation, by both parents, for about 35 days. Young, blind, downy and helpless, when hatched. One annual brood.	Courts by soaring and calling, begins in February. Mates for life. Nest, of coarse sticks thrown together, 30 to 40 feet above ground in tree, or on cliff. Eggs, 2 to 4, dull white, irregularly marked with cinnamon brown, 2.50 by 2 inches. Incubation, 28 days, by female. Young, blind, slightly downy, helpless when hatched. One annual brood.	Nest, bulky pile of sticks, used year after year, in tall pine, elm, birch, maple or beech. Eggs, 3 to 5, dingy or bluish white, with brown spots, 2.15 by 1.65 inches. Incubated, by female, 27 to 28 days. Young, blind, slightly downy, and helpless when hatched; assume adult plumage by 18 months. Young with tail-bars less clear.	Male, courts by soaring high, followed by tumble and rattling screech. Nest, on ground, in marshes and made of twigs and grasses. Eggs, 4 to 6, dull, bluish white, 1.75 by 1.4 inches. Incubation, by both parents, begins before full set is laid, normally 26 to 31 days. One yearly brood. Young, blind, helpless when hatched, getting mature plumage by 2 or 3 years.
FOOD AND ENEMIES	Food; animal matter, often carrion and old fish. Stomachs of 80 showed: 35, with wild vertebrates; 12, with poultry. It is in some ways a scavenger. Unable to lift anything weighing over 15 pounds. Soars majestically, high in air. Young, get white feathers of head and tail, in fourth or fifth year, when they mature.	Food; mainly mice, rabbits, insects and snakes. Individuals may develop chicken-killing habit when other food is not available. Poultry and game constitute probably not over 10% of total food. One of the most valuable checks on mouse infestations and the name "hen-hawk" is a most unfortunate and inappropriate misnomer. Temperature, 106° F.	Food; about 65% mice, and other small ground animals; rarely poultry, though this is one of the so-called "hen hawks" so commonly killed as vermin. Of 444 stomachs examined, 287 contained mammals; 7, poultry or game; and 25, other birds. When mice and ground squirrels are abundant, a surplus may be piled around nest with the young.	Food; animal matter. Stomachs of 418, showed 250 contained mammals; 176, other birds; 11, insects; 10, poultry or game. This is the "marsh harrier" which flies, alternately flapping wings and soaring, back and forth, relatively close to the ground. Call, a screeching, "cac, cac, cac," in breeding area, from March to November.
RELATION TO MAN	This is our national bird. As such, and because of its generally harmless nature, is protected by national law and specifically by many states as well. Individuals may uncommonly develop habit of killing sheep and young pigs. Most reports of depredations are probably false. Provides a thrilling sight in flight.	Essentially useful species, except possibly around game farms. Protected by law in many states; should be in all. A shy hawk, but has habit of perching in a conspicuous place from which it may be shot easily. In flight, shows conspicuous white area on breast, with streaks to rear, and unbanded tail in adult.	Possibly most useful mouse and rodent destroyer of all hawks, therefore one of most useful species to man, though one of those most tormented. Numbers of hawks increase with numbers of mice and ground squirrels usually unless they are shot off. This species is protected by laws in 24 states and should be everywhere.	Divided about equally, as a useful species and as a destroyer of other useful species. It is rarely injurious to poultry; commonly a great destroyer of mice, but at all times an interesting bird to watch. It is protected by law in many states. Conspicuous enough with white rump to be recognized by most people as being different from other hawks.

GOSHAWK *Astur atricapillus* Order Falconiformes. Family Accipitriidae.	COOPER'S HAWK *Accipiter cooperi* Order Falconiformes. Family Accipitriidae.	SHARP-SHINNED HAWK *Accipiter velox* Order Falconiformes. Family Accipitriidae.	DUCK HAWK *Falco peregrinus* Order Falconiformes. Family Falconidae.	SPARROW HAWK *Falco sparverius* Order Falconiformes. Family Falconidae.
Length, 22 inches; wing-spread, 44.5 inches; tail, 10 inches; wing, 13 inches. Weight, to 4 pounds; female, larger. Tail, gray- or white-tipped. Wings, with 4 or 5 dark bands. Upper parts, bluish slate. In flight, appears like a short-winged, long-tailed, blue-gray hawk, with light gray breast; larger than a crow. Young, brown instead of slate.	Length, to 20 inches; wing-spread, to 3 feet. Female, much larger than male. About size of crow, but more slender. Tail, long, distinctly rounded, as contrasted with square-tipped tail of smaller Sharp-shinned Hawk. Wings, stubby. Flight, alternate flapping and sailing. Average Cooper's, weighs twice average female Sharp-shinned.	Length, to 12 inches; wing-spread, to 23 inches; tail, 7 inches. Female, slightly larger, with length to 14 inches. Weight, male, 3.5 ounces; female, 8.25 ounces. Larger and slimmer than Sparrow Hawk or Pigeon Hawk. Tail, long, slender and *square-tipped,* rather than rounded as in the larger, longer-winged Cooper's hawk.	Male, length, to 18 inches; wing-spread, 43 inches. Female, length to 20 inches; wing-spread, 46 inches. Female larger than male. Tail, with 6 or more, narrow, black bars; almost pointed. Lower half of head, conspicuously black and white. Male, with browner face and more conspicuous tail-bars. Contrasts of black and white on face, conspicuous.	Male, length, 10.6 inches; wing-spread, 22 inches. Female, length, 12 inches; wing-spread, 24.5 inches. Weight, 4 ounces. Female, usually larger than male. Crown, ash-blue; conspicuous black patch on side of head. Back, chestnut or cinnamon and black-barred. Tail, bright red-brown, with narrow black bars. Only small hovering hawk.
Woods or in open. Breeds, from northwestern Alaska to northern Ungava, and south to New Mexico and Pennsylvania. Winters, in southern part of nesting range and south to Virginia, Texas, northern Mexico and southern California. Also in Idaho, Arizona, Florida, and Ireland and England occasionally. In California Pleistocene.	Breeds, from southern British Columbia, to southern Quebec and south to northern Mexico. Winters, from southwestern British Columbia and Washington to California, New York, southern Maine to Costa Rica. Active, in daytime, following the migrations of smaller birds and taking its toll of them.	Breeds, from northwestern Alaska to Newfoundland and south to northern Florida and southern British Columbia. Winters, from southeastern Alaska to New Brunswick and south to Panama and Guatemala. Related races in Cuba, Haiti and Porto Rico. Known from Pleistocene of California. Essentially, a woodland species.	Breeds, from Alaska to central Greenland, and south to central Lower California, Texas, Tennessee, Pennsylvania and Connecticut. Winters, from Vancouver Island to southern New York, and south to California and Panama. Occasional in England and South America. Known from the Pleistocene of California.	Four subspecies; include the Eastern, the Desert, the San Lucas and the Little Sparrow Hawks. Breeds, from upper Yukon to Newfoundland and south to California and Lower California and Florida. Winters in southern part of range and on to Panama and Mexico. From Florida and California Pleistocene.
Nests, in large tree. Nest, a huge pile of sticks. Eggs, 3 to 5, white or pale blue, 2.3 by 1.7 inches. Incubation, by female, about 28 days. Young, at first blind, naked and helpless, eating animal matter from the first. Assumes adult plumage by 1.5 years, but is not fully mature until autumn of third season. One brood a year.	Nests, usually in tall tree. In low-tree country, may nest on ground. Nest, a loose pile of coarse sticks. Eggs, 3 to 6, pale, bluish white, often brown spotted, 1.5 by 1.9 inches. Incubation, by female, 24 days. Young, blind, slightly downy, and helpless when hatched but soon covered with gray down; molts similar to those of Sharp-shinned.	Nest, usually high in tree, of loose sticks, about size of crow's nest, about 6 inches deep; sometimes bark-lined. Eggs, 3 to 6, bluish white to cream, spotted with chocolate, 1.55 by 1.2 inches. Incubated, 21 days, by female. Young, downy, blind, helpless, when hatched, assuming adult plumage in 2 years. One brood a year.	Mates, as early as March. Nest, on a high ledge or in a tall, hollow tree, made of sticks. Eggs, 3 or 4, buff to reddish brown, 1.7 by 2.1 inches. Incubation, by both sexes, 28 days. Young, white, downy and helpless when hatched. Adult plumage assumed gradually, after the first winter, when juvenile plumage is molted.	Courting male, hovers over mate and dives. Nests, in bird house or hollow tree. Nest, chip-lined or bare. Eggs, 3 to 7, white to brownish, with finely shaded areas, 1.4 by 1.12 inches. Incubated, by both sexes, 29 to 30 days. Young, blind, downy and helpless when hatched, but attain adult plumage when about 18 months old. Probably mates for life.
Of 881 stomachs examined, 441 contained poultry and game; 233, mammals, largely mice; 49, other birds. Usually wait in some tree or thicket where it is inconspicuous and flies suddenly into open to attack prey which is caught so quickly that frequently, slower flying, more conspicuous species get the blame. Active in day time.	Food; largely birds. One of worst enemies of small birds and poultry. Of 422 stomachs examined, 78 contained game birds and poultry; 146, other birds; 65, mammals; 6, other animals. Powerful enough to kill ducks, rabbits and grouse. Call, a "cuck, cuck."	Food; largely birds and insects. Over 1000 stomachs examined showed, 884 containing other birds; 16, poultry; 45, insects; and 28, mammals. Known to kill large numbers of grasshoppers and moths. Brave, in attack, even on larger birds. Flight, with quick wing beats and alternate sailings. Call, a repeated, "quee."	Food; animal matter. Of 102 stomachs, 70 contained other birds; 11, poultry; 12, insects. These are all caught by pursuit in a truly phenomenal manner which wins admiration for the bird by most bird lovers. Prey caught by dropping from great height with incredible speed or outflown and outdodged. Flight speed, 200 (?) miles per hour.	Food; principally mice and insects. Of 427 stomachs examined, 147 contained mammals; 69, birds, mostly sparrows; 269, insects; 29, spiders; 13, reptiles or amphibia; and 29 were empty. One contained remains of a bobwhite which may have been a wounded bird. The young birds remain in the nest about 3 weeks.
Probably the most destructive of hawks. Pennsylvania, with a $5 bounty, killed 80 in 1929, and 1,090 in 1937 demonstrating ineffectiveness of bounty system. Goshawks are protected in 10 states and they seem to increase as the more valuable and more conspicuous species are killed off by ill-advised "vermin" campaigns.	Possibly, best entitled of all hawks to title of "vermin" and is not usually protected by law. Still it probably serves a rôle in eliminating weak and wounded birds and mammals but usually because of its sly ways lets other species pay for its sins.	Not protected by law ordinarily but probably is less destructive than is assumed by many. Profits by "vermin campaigns" against more conspicuous hawks by having competition removed. Probably, may be considered as "vermin" *if* the name must be applied to so small a bird.	Food habits make it unpopular with many sportsmen but very popular with sportsmen who follow falconry because this is a most important bird for use in this sport. Male is called a "tiercel," or "thirdling" implying that the third egg produces a male. Protected by law in at least 15 states. Temperature, 106° F.	Undoubtedly, a useful species; destroys large numbers of mice and insects. Makes an excellent pet but a license to keep them captive is necessary in many states. It is protected by law in 23 states. Not "vermin" in any sense. Our representative of the European "kestrel." Temperature, 107° to 108° F.

COMMON NAME SCIENTIFIC NAME	OSPREY *Pandion haliaetus* Order Falconiformes. Family Pandionidae.	BARN OWL *Tyto alba* Order Strigiformes. Family Tytonidae.	GREAT GRAY OWL *Scotiaptex nebulosa* Order Strigiformes. Family Strigidae.	GREAT HORNED OWL *Bubo virginianus* Order Strigiformes. Family Strigidae.
DESCRIPTION	Length, to 24.5 inches; wing-spread, 72 inches. Female, larger than male, but less difference than in most hawks. Weight, male, to 3 pounds, 4 ounces; female, to 4 pounds, 10 ounces. Dark brown above, sometimes with white on top of head, but not on back of neck; usually, white below. Wings appear bent in flight. Hovers and plunges feet-first.	Length, to 21 inches; wing-spread, to 47 inches; tail, to 7 inches. Weight, female to 24 ounces; male, to 20 ounces. In pairs, female usually larger but not always. Lightest colored of our owls, with face like a great white heart. Sexes colored alike. Young, like adults even in juvenile plumage. Temperature, 103° F.	Length, to 33 inches; wing-spread, to 60 inches; tail, to 15 inches; bill, to 1.75 inches. Weight, to 2 pounds, 14 ounces. Largest of our owls. Marked much like the Barred Owl, but with no conspicuous cross bandings on breast and with eyes yellow rather than nearly black. No ear-tufts. Size and round head usually sufficient identification.	Length, to 23 inches; wing-spread, to 52 inches; tail, to 9 inches; bill, to 1.6 inches. Female, length 25 inches; wing-spread, 60 inches. Weight, male, 3.5 pounds; female, to 4.5 pounds. Conspicuous, feathered ear-tufts, powerful talons and beak. Great round, yellow eyes. Feathers, loose; flight, quiet. Temperature, 105° F.
CLASSIFICATION AND RANGE	The single species breeds, from northwestern Alaska to Labrador and Newfoundland, south to Lower California and Florida Keys. Winters from Florida and Gulf States through Lower California, Mexico, Central America and in Peru, Chile, Paraguay, Greenland, Europe, Asia, Australia through closely allied species. Known from Florida Pleistocene.	Resident from Washington to New York and south to southern Mexico, Nicaragua and the Gulf States. Of occasional occurrence in British Columbia, Manitoba, Minnesota, Ontario, Vermont and Massachusetts, with allied races in Europe, Asia and the West Indies and elsewhere.	The typical great gray owl breeds from north central Alaska tree-limit to Ontario and south to central California and probably to Utah, and winters through southern Canada south to New Jersey. Lighter colored individuals taken in western Alaska are referred by some to a migrant race from Siberia.	Ten subspecies occupying most of wooded North America include, besides the typical form, the Arctic, the Labrador, the Montana, the Saint Michael, the Northwestern, the Dusky, the Pacific, the Western, and the Dwarf. Horned owls known from Pleistocene of Oregon and California. Birds move south in winter, the Arctic form even to New York.
LIFE HISTORY	Nests, year after year, in same site, adding to old nest on pole, tree or ground, to make huge pile of coarse sticks. Eggs, 2 to 4, dull white, or buff, with chocolate-brown markings, 2 by 2.45 inches. Nest defended by both parents. Incubation, chiefly by female, 28 days. Young, blind and helpless, when hatched require 18 to 30 to mature.	Breeds in hollow trees, banks, towers, deserted buildings, but makes no nest. Eggs 5 to 8, or even 11, chalky white, or tinged with yellow, 1.97 by 1.5 inches; more pointed than usual owl egg. Incubation, beginning with the first egg laid, 21 to 24 days or longer, mostly but not solely, by female. 1 or 2 broods.	Nests usually over 20 feet up, in tall tree. Nest of sticks, plant or feather-lined. Eggs, 3 to 5, white, smooth, 2.3 by 1.8 inches. Incubation, by female, for unknown time. One annual brood. Young, downy and helpless when hatched, brownish white, but darker across upper parts. Young, hatched in April, appear like adults by October.	Nests in gorges, in caves or in heavy timber, rarely in hollow trees, but more commonly by remodelling nest of crow or hawk. Eggs, 2 to 5, dull white, granular, 2.3 by 2 inches. Incubation, by both sexes, for from 21 to 30 days. One annual brood. Young, downy white when hatched, but apparently adult by first winter.
FOOD AND ENEMIES	Food fish only; never takes birds, and so is desirable about poultry yards as it drives away species that might do so. Catches fish by spectacular plunge, and may be robbed of its meal by the more powerful eagles. Sometimes drowns when it becomes attached to fish too large to be lifted. Individuals cooperate against enemies.	Family of 7 young owls requires daily or nightly 150 rats, mice or other small mammals. One half-grown owl known to eat 9 mice one after another, though the tail of the last could not be downed. Stomachs of 39 showed; 17, with mice; 17, with rats and other small mammals; 4, with insects.	Food consists largely of mice, rabbits, and small birds. Of 9 stomachs examined, contents showed 7 with mice; 4 with other mammals; 1 with a small bird. Other reliable reports show that northern hares and red squirrels are commonly taken; one had eaten 13 redpolls, and another killed and carried away a domestic fowl.	Food; a variety of small animals, particularly rabbits and rats. Of 127 stomachs examined, 13 had mice; 65, other mammals; 31, poultry; 17, were empty; 10, insects; 1, fish; 1, scorpion; 8, other birds. One nest had 113 freshly killed rats on it. Animals are swallowed head first.
RELATION TO MAN	Entirely useful to poultrymen and of little damage to interests of fishermen. Guides fishermen to good fishing grounds and so helps them. Few records of osprey doing any damage to game. Protected by law in at least 28 states and worthy of further protection. A thing of beauty over any large body of water.	Probably the most useful of all wild birds as an enemy of rats and mice and should be protected at all times; illegally sold in pet shops as "monkey-faced owls" even though in the same state it may be illegal to keep barn owls in captivity.	This owl is not as aggressive as the Great Horned Owl. Considering that the great gray is found mainly in wild places, one must conclude that the general statement that owls are the most beneficial of all birds probably applies to this species.	Of neutral value in a wilderness area, since it lives on animals, and on their enemies as well. About game farms, and about poultry yards, it may well be a menace not only to the species being raised, but to the rats that prey upon them, as well as on the weasels that may prey upon the rats.

BARRED OWL *Strix varia* Order Strigiformes. Family Strigidae.	SNOWY OWL *Nyctea nyctea* Order Strigiformes. Family Strigidae.	LONG-EARED OWL *Asio wilsonianus* Order Strigiformes. Family Strigidae.	SHORT-EARED OWL *Asio flammeus* Order Strigiformes. Family Strigidae.	SCREECH OWL *Otus asio* Order Strigiformes. Family Strigidae.
Length, to 24 inches; wing-spread, to 50 inches; tail, to 10 inches; bill, to 1.5 inches. Weight, to 2 pounds. Female, averages heavier than male. A large, gray "earless" owl, with bars crossways on the breast, and streaks lengthwise on the belly. Eyes, large, nearly black. Feathers, loose and fluffy.	Length, to 27 inches; wing-spread, to 66 inches; tail, to 10.5 inches; bill, to 1.6 inches. Weight, female, to 5 pounds; male, smaller. Pure white, or with reddish brown or grayish brown fleckings on the feathers. Female, with more dark markings than male. Young, even darker. Legs, well feathered. Eartufts, lacking.	Length, to 16 inches; wing-spread, to 42 inches; tail, to 6.5 inches; bill, to 1.1 inches. Eye, yellow. Appears about the size of a crow, or like a small great horned owl with lengthwise streaks rather than cross bars. Grayer than short-eared owl, which it otherwise resembles in flight. Weight, 11 ounces; female, the larger. Temperature, 103° F.	Length, to 17 inches; wing-spread, to 44 inches; tail, to 6.6 inches; bill, to 1.2 inches. Weight, female, 13 ounces; male, 17.5 ounces. Slightly smaller than crow, with shorter "horns" than Long-eared Owl; generally lighter and more yellowish. Chiefly, white undersides; wings and tail, dark. Call, a "toot, toot, toot" and high pitched shrieks.	Length, to 10 inches; wing-spread, to 24 inches; tail, to 3.7 inches. Female, weight, to 7 ounces; male, to 6 ounces. Two color phases, a gray and a reddish, each with feathered ear-tufts and generally streaked plumage, which is loose and easily fluffed to make bird appear unnaturally large. Eyes, large, yellow and round.
Three subspecies recognized, the Northern, the Florida and the Texas. The species breeds from central Alberta to Newfoundland and south to Florida and Texas. Found in fossil form in the Pleistocene of Florida.	Breeds from Bering Sea to Greenland, and south to central Mackenzie and northern Ungava; also, in northern Russia and Siberia. Winters, from the Arctic coast south, even to Georgia and California. Found also in Germany, Russia, Scotland and the Shetland Islands.	Breeds from central British America to Newfoundland and south to southern California, northern Texas and Virginia. Winters, from southern Canada to Florida and central Mexico. Prefers evergreen forests, but may live anywhere, particularly in migration. Rarely seen doing daylight hunting. Found in California Pleistocene.	Breeds from northern Alaska to Greenland and south to California and New Jersey; also in Europe and Asia. Winters, from British Columbia to Massachusetts and south to Cuba and Guatemala. Known from Pleistocene of California. Roosts on ground, usually in open country, and often active in daytime as it flies with steady beating flight.	Resident. Fifteen subspecies recognized, including the Eastern, the Southern, the Florida, the Texas, Hasbrouck's (Texas), Aiken's, the Rocky Mountain, MacFarlane's, Kennicott's, Brewster's, California, Pasadena, Mexican, Sahuaro, Xantus's—these covering most of the United States, Mexico and wooded Canada.
Nests, usually in dense woodlands or wooded swamps in tall timber. Nest, in hollow tree, or in a rebuilt nest of crow or hawk. Eggs, 2 to 4, white, somewhat glossy, and slightly rough, 2 by 1.75 inches; laid in late February. Incubation, to 28 days, probably chiefly by female. One annual brood. Young, yellow and downy, when hatched.	Nests, in open country, only rarely where there are trees. Nest, a depression in the soil or on a rocky shelf. Eggs, 4 to 11, white, with smooth surface, 2.5 by 1.9 inches. Incubation, about 32 days, by female, and but one yearly brood. Young, blind and helpless when first hatched. Grow lighter in color with age.	Nests, usually in a coniferous tree, from 10 to 30 feet up. Nest, usually remodelled nest of heron or crow. Eggs, 3 to 7; egg-weight, .82 ounces, white and smooth; 1.75 by 1.5 inches. Eggs, laid on alternate days but incubation begins with laying of first. Incubation, 21 to 30 days. Young, in nest 25 days. One annual brood.	Nests, on ground, in open, merely by tramping down the vegetation or bringing in a few sticks. Eggs, 4 to 7, white or creamy, smooth, 1.6 by 1.3 inches, laid in May or June. Incubation, believed to be 3 weeks, and mainly by the female. One brood commonly, but possibly two as is the case in Europe.	Nests, in bird boxes, or hollow trees, favoring orchard trees. Nest, straw-lined. Eggs, 3 to 7, weight .58 ounces each, white, usually smooth, 1.55 by 1.35 inches. Incubation, for 21 to 25 days, by one sex or by both. One annual brood. Young, white and fluffy when hatched, but feathered practically like adults by first fall.
Food; chiefly mice, and other rodents. Of 109 stomachs, the contents were; 48, with mice; 18, with other mammals; 20, empty; 9, with crawfish; 7, with small owls; 5, with other small birds; 14, with insects; 4, with frogs; 4, with game birds or poultry, including 1 ruffed grouse.	Food; essentially small animals. Stomachs of 38 birds, 33 of which were taken in the United States showed; 18, with mice; 12, empty; 9, with non-game birds; 2, with game birds, and 2, with mammals other than mice; the birds taken were sea birds. It may kill a few domestic fowl.	Food; almost exclusively mice and other small mammals. Stomachs of 23 examined showed: 22, with mice, and the other, with a small bird. Of 107 examined, 84 contained mice, and 15, small birds. Excess and waste is regurgitated as pellets; 225 showed 187 containing small mammals, mostly mice.	Food; as follows; 101 stomachs showed: 77, with mice; 11, with small birds; 7, with moles or shrews; 7, with insects; 14, empty. One stomach had 30 huge grasshoppers in it. It usually prefers territory where there is an abundance of mice and, where there is such an infestation, short-eared owls may be expected to move in.	Food; stomachs of 255 showed: 100, with insects only; 21, with mice; 38, with other birds; 43, empty; 21, with lizards; 9, with crawfish; 7, with miscellaneous matter; 5, with spiders; 4, with frogs or salamanders; 2, with earthworms; 2, with scorpions; 1, with poultry. Eight stomachs contained 2,976 insects and 2 mice.
Economically, it is obviously beneficial in spite of the fact that it may catch chickens forced to roost in trees at night. Its preference for mice indicates its primary service to man which is obviously not always appreciated. A barred owl calling in the vicinity of a summer camp has made a whole vacation memorable to many a youngster.	Serves as an important check on mice and lemmings, which, without check, would destroy most of the vegetation of the north country. In the north, then, the bird is practically essential to a balanced environment. It may be a serious pest around game farms and, if poultry is left unprotected, during the cold weather.	One of the best of all the mouse-catching owls. Therefore, worthy of every measure that may be employed to protect it. It is undoubtedly killed by many hunters carrying on "vermin campaigns" under the impression that it is a great horned owl. Partly because of this, such campaigns are generally wholly ill-advised.	This owl is essentially useful as a mouse check and because of its daytime activity it is frequently killed by ill-advised hunters carrying on the foolish "vermin campaigns" sponsored by many groups. Farmers should prosecute anyone killing this important friend of their interests.	For economic importance, their record is written in stomach contents as listed above. That they are essentially useful and deserving of protection should seem obvious to any fair-minded person unless he loves mice, because mice destroy crops needed by man. Known from Pleistocene of Tennessee, California and Florida.

(Continued from page 195)

flight of eagles is commented on in Proverbs, Jeremiah and in Obadiah. The speed of vengeance is compared in Deuteronomy with the speed of the eagle's flight, and Nebuchadnezzar's "high command" attempted to impress someone with the speed of his march on Jerusalem by saying that his horses were "swifter than eagles."

Some of the Biblical references to birds of prey must have been based upon superstitions. In the 103rd Psalm, David speaks of the eagle renewing its youth presumably by the technique of eating its young. But the eagle's concern for its young is considered exemplary in Exodus, 19, and in Deuteronomy, 32, where it is cited as comparable to God's providential care for Israel.

More modern references to birds of prey are numerous—and contradictory. The owl in the legend is the "wise old owl" that "lived in an oak." Yet another proverb says: "The gravest bird is an owl and the gravest man is a fule."

Churchill uses the owl to describe misfortune when he says: "Misfortune, like the owl, avoids the light", and another writer uses a bird of prey to describe hope when he says: "Our hopes, like towering falcons aim, at objects in an airy height."

Anyone who has read Samuel Scoville's "The Raven's Nest", or some of Charles G. D. Roberts' more imaginative eagle stories, or who has seen the movies of the Englishman, Captain Knight—and heard him lecture with his birds sailing over the heads of excited audiences—knows that there are humans who love these birds for themselves.

SCREECH OWL

BARRED OWL

GREAT HORNED OWL

Such beautiful books as John May's *The Hawks of North America,* and such popular bulletins as Leon Hausman's *Hawks of New Jersey,* all add their bit to the folk-lore about birds of prey. We hope these will be representative of the efforts of our generation in the years to come. We need a richer literature that will combine Scoville's glib humor; May's scholarly presentation of detail; the touch of the romance of Roberts, and the showmanship of Knight.

We need to use every vehicle for public education to present honestly the important role of these birds. We must avoid such fallacies as that of eagles carrying away children. We need careful scrutiny of news items by outdoor writers to avoid stories cooked up to be as dramatic as possible. A recent newspaper clipping told of a man who saw his child attacked by an eagle. He ran into the house, got his rifle and, when it was a hundred feet in the air, wounded the bird in such a way that it brought the child safely to the ground. Then the man spent some minutes beating the bird to death. Such a story is obviously so full of absurdities that its only place in a newspaper is on the comic page.

The soaring hawk taught much to early designers of airplanes. I well remember when I first went to college seeing college professors experiment with stuffed birds suspended by strings from the bridges that span the gorges of Ithaca, and under which wind currents had a more or less constant speed and direction. These primitive wind tunnels have, of course, given way to more precise methods, but bird models contributed to our modern flying fortresses and trans-oceanic air liners.

Soaring birds help gliders locate otherwise hidden rising columns of air. We need more such animals to aid observers who provide the data for weather prediction. And we need more observers intellectually sensitive to animal behavior and appreciative of both the biological aspects and physical science.

We might include other people to whom birds of prey appeal. There is much in the geography of these creatures; much that is interesting about the seasonal variations in habits and in distribution. We could elaborate on the findings of the professional biologists, telling how they know that there seems to be a relationship between the number of preying birds produced in a family and the abundance of the species on which they prey.

This would emphasize the fact that in most birds of prey incubation begins with the laying of the first egg. As a result, the first bird to hatch is older by at least a day than his brother or sister. Because of this, he is better able to get his share of the food. If the food is scarce, he thrives while his younger brothers and sisters starve. If, then, there is much food, there are many birds of prey; if there is little food, there are few birds of prey. This, of course, is as it should be. It is merely a part of that phenomenon which we call the balance of Nature.

If this article helps to rationalize the adjustment between man and birds of prey, it will fulfill the mission to which the author committed himself. If efforts such as this are not helpful in developing a real appreciation of the birds, if legislation fails, and if prejudice, lust for killing, and stubborn narrow-mindedness prevail in our dealings with the birds, then, truly, we will have to fall back largely on the prayers of some of us to save the birds. In this, we will undoubtedly need wholehearted cooperation of others, therefore the title given this article.

As We See It

FOREST ★ ★ PROTECTION

In an open letter to the Congress, Ovid Butler, secretary of the American Forestry Association, has urged that forest protection be given war priority rating, and that the Civilian Conservation Corps be re-defined to provide a mobile agency with essential war status to aid in this protection. This is an important recommendation and it relates to a phase of the prosecution of the war that has not been given adequate consideration by those in authority.

The demands of war will draw heavily on our forest resources. Mr. Butler points out that two and one-half billion feet of lumber have already been called for, and more than a billion more will be required under contracts already let by the War Department. This means greatly stepped-up cutting and vastly increased fire hazard as an inevitable result.

Another threat to the forests—and to the country—lies in the possibilities of incendiary bomb raids directed at the forests, or fires resulting from organized sabotage. Under the cover of the pall of smoke arising from extensive fires enemy attacks might conceivably be undertaken. If increased lumbering and possible enemy activity be coincident with a dry season we will be confronted with a condition that must not be ignored; one that must be anticipated.

"The situation in our judgement," says Mr. Butler, "is so potentially serious as to warrant forest protection being rated as a war priority. Certainly it challenges the wisdom at this time of permitting continued curtailment of the CCC and diversion of its remaining forces to work of less importance than that of guarding resources essential to the maintenance of the war. The present undetermined status of the Corps in the face of the imperative forthcoming need of men in the forest protective field seems unrealistic in relation to the war emergency. The Corps is an established operating organization experienced in patrolling the forests and dealing with forest fires. Its camps are already established and distributed throughout the forest areas. It is in a position to occupy them quickly and to shift its men from one forest region to another as critical fire periods develop."

As this is written the fate of the CCC still depends on Congressional action. There is no doubt that many of the public works activities of the organization can be done away with during the war. It is true that many of the men are being absorbed into the Army or into industry, automatically restricting the Corps. Nevertheless there are men under draft age, or for some reason rejected by the draft, who could serve their country in an important capacity in a CCC organized for the vital task of forest fire protection.

The need of some such organized agency is emphasized by Mr. Butler by pointing out that the available supply of men normally taken on during the summer for fire work is seriously diminished. Local protection agencies cannot compete in wages with war industries, so fire fighting reserves are reduced to a danger point. Under the circumstances it is certainly pertinent to ask whether it is common sense to retire an organization of trained and able fire-fighters.

Economy in non-defense expenditures must, of course, be the order of the day. Successful conduct and financing of the war is the major consideration. But there is a point where economy often becomes too expensive, and if it endangers our forest resources it certainly has arrived at that point.

Our forests are an essential, vital source of supply for war. Lumber for airplanes and for cargo and fighting ships, for camp buildings, for crates in which to ship food and equipment to the fighting fronts—are among the many war needs. We cannot afford to neglect the forests that produce this wood. Every acre burned is lost for decades to come and thus we cannot afford to gamble with fire.

We talk in terms of billions of dollars about airplanes and battleships, anti-aircraft guns and tanks, but we should not lose sight of the tremendous importance of maintaining, at a relatively minor cost, an adequate force on the fire lines. They will be battling for something that is vital to the men on the fighting lines.

Conservation Comment

"Have a fag bag," will be the invitation of forest rangers in the four major National Forests in southern California this year. They will hand visitors a little red cloth bag large enough to hold a package of cigarets and a paper of matches. To the bag will be attached a tag urging the recipient to use it for this purpose while in the forest, and informing him that "The Nation's Forests Are Yours. Honor Smoking Rules and Help Prevent Forest Fires." The reverse of the tag will read: "I am fire conscious! I smoke only in posted areas. I realize that fire destroys wildlife and recreation. I pledge my full cooperation in preventing fires." And there will be a place for signature. Material for these bags is needed. Old sugar, salt and flour sacks will provide it. Girl Scouts and junior members of the American Legion Auxiliary will make and dye the bags. A quarter of a million of them are required. Friends of the forests are urged to contribute this material to the nearest Forest Service office, the address of which may be obtained from the U. S. Forest Service, 1443 Federal Building, Los Angeles, California.

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One plank in the legislative program of the Women's City Club of New York for 1942 reads: "At this particular time when our wartime economy demands a restriction of consumer goods, outdoor advertising which ordinarily stimulates purchasing must be curtailed. Therefore, we can no longer delay the long-needed regulation of outdoor advertising, which we have urged for many years in order that the beauty of our scenery and the safety of our highways may be preserved."

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The twentieth annual meeting of the Izaak Walton League of America will be held in Chicago March 26 to 28. Headquarters will be at the LaSalle Hotel. The sessions of the first day will be devoted to League matters, while Friday, March 27, will be given over to general discussion of conservation issues by leaders in this field.

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Fireworks and facts are promised at the sessions of the Seventh North American Wildlife Conference to be held in Toronto, Canada, April 8 to 10. The fireworks are likely to be set off at the session devoted to the discussion of the sportsman and his problems when this subject will be discussed by those with such divergent views as E. S. Russenholt of Ducks Unlimited; Mrs. C. N. Edge of the Emergency Conservation Committee; John H. Baker of the National Audubon Society, and others. Facts will be presented at the general sessions concerned with wartime uses of natural resources and at the special technical sessions of the Conference. The public is cordially invited.

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With every source of possible tax revenue being discussed, there is an excellent probability of a Federal tax on billboards. This was proposed last year but was eliminated from the tax bill under pressure from the billboard industry. Contention was made that no form of advertising should be taxed. It is, however, pointed out that the billboard industry is in a class by itself, and this view has been sustained by decisions of the Supreme Court. It is the only form of advertising deriving its profits largely from public investment and making no return for this investment. Where newspapers, magazines and radio provide advertising media by costly investment in circulation, the billboard's circulation depends mainly upon the vast public investment in the highways that the billboards line. It offers no services in exchange for its circulation and, instead, depreciates property values and affects adversely the efficiency and safety of the highways.

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The National Audubon Society had agreed to approve a change in the New York law restricting the sale of wild bird plumage so far as to permit the legal sale of the feathers of mandarin ducks, golden pheasants and gray or Sonnerat's junglefowl. The New York Legislature, however, went further and passed an amendment exempting from the provisions of the Plumage Law all fly-tyers. As this issue goes to press the Audubon Society was conducting a last-ditch fight for gubernatorial veto. The amendment was actively supported by sportsmen's groups. The vituperative debate that has been stirred up by this law has established a new high for misinformation and half-truths.

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The Indiana Department of Conservation announces mailing of 15,000 questionnaires to sportsmen whose names have been taken at random from the license lists. Information sought, among other things, would reveal the kill of a number of species of birds and mammals during 1941. This sort of information should be required of every sportsman in every state as a prerequisite to obtaining a license for the next year. Until we have an accurate knowledge of the annual kill we shall never be able to arrive at *real* game management and regulation of the kill so that adequate supplies of all wildlife may be maintained.

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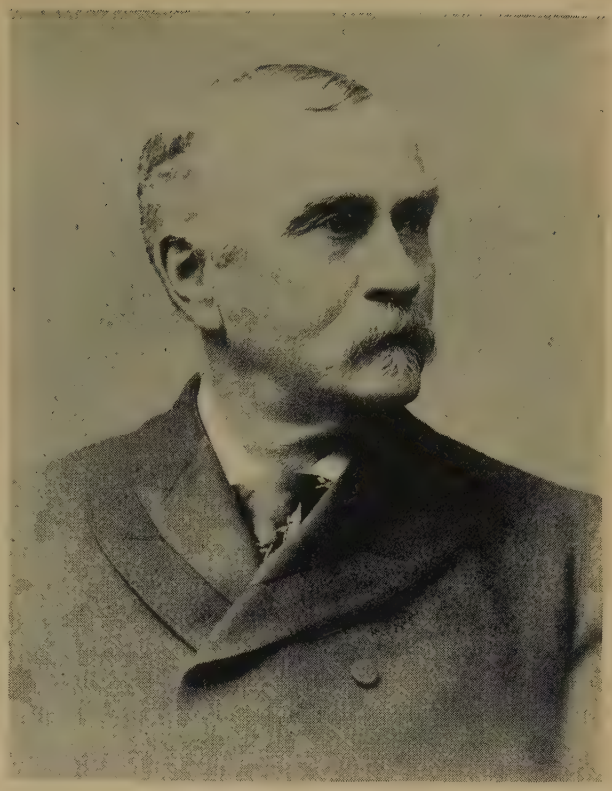
Use of certain areas in Mount Rainier National Park for the training of ski and mountain troops has been permitted by the Department of the Interior. This is announced as on a "temporary basis". Plans for the training of these troops after the skiing season is over call for special work in rough mountain terrain. Whether this will be carried on in the Park is not announced. Preservation of scenic values and wildlife will not be neglected, National Park Service officials reassure those who see threat to the integrity of the parks through this wartime demand.

A vision of plains planted with many trees inspired—

The Man Who Gave Us Arbor Day

By HENRY CLEPPER



J. STERLING MORTON, 1832–1902

IN 1832 an American was born. He lived out exactly his allotted span of "three score years and ten," and died in 1902. During his lifetime he held several important official positions—one of them the secretaryship of the U. S. Department of Agriculture—but these public offices the world has forgotten, as it has almost forgotten the man himself.

What the world has not forgotten, we hope will never forget, is an idea he launched—a symbol of faith that also rounds out this month a span of three score years and ten. Unlike the man who gave it life, however, his ideal has had an annual rebirth in the minds and hearts of people everywhere, so that in 1942 it is a more vigorous force than the day it captured the imagination of Nebraska farmers seventy years ago.

The man was J. Sterling Morton. His idea was Arbor Day, celebrated for the first time in Nebraska on April 10, 1872.

In the 1870's the United States was still a young nation, but with all the vigor and imagination of youth. Communications might be slow and high speed transportation nonexistent, but it was an age of ideas, and ideas spread. So it was with Arbor Day. Within four years, three more states—Kansas, Tennessee, and Minnesota—had celebrated Arbor Days; ten years later North Dakota and Ohio had followed Nebraska's lead.

Although definitely an American institution, Arbor Day was soon adopted internationally; in 1887 in Canada, in 1895 in Spain, in 1905 in Hawaii. Meanwhile all the rest of the states and territories had begun to observe it also, either by legal enactment, by gubernatorial proclamation, or unofficially by schools.

To catalog the dates and occasions of the first celebration of Arbor Day in each state and nation would exhaust alike the available space and the reader's patience. In brief, it is now observed throughout the world. But it is interesting to record that Arbor Day is a legal holiday in Nebraska and falls on April 22, the birthday of its founder.

It must not be assumed that tree planting in America had no beginning prior to the Arbor Day movement. Soon after the War between the States, a number of public-spirited citizens in widely scattered localities, but especially in the East and middle West, began to realize something that most Americans of that age doubtless thought unbelievable, if they thought of it at all—that the nation's forests were exhaustible. That there was little popular sentiment for forest conservation is understandable. The tremendous timber stands of the West and South had hardly been touched. Not only that, in places forests were still considered a hindrance to agriculture and settlement because of the labor necessary to clear the land.

Evidence exists that tree planting projects were carried on in some communities, notably in New England, long before 1872. In fact, it appears that some individuals had proposed that a special day be designated for community tree planting. A probable reason why the suggestion failed to get support is because there was no distinctive name for it. Among other names, Sylvan Day was offered, but presumably it was not popular. Then J. Sterling Morton thought of Arbor Day, and thus gave a name to what was to become one of the greatest conservation movements in American history.

Morton was not a native of Nebraska. He settled there in 1854. At that time the country west of the Missouri River was called the great American desert. Nebraska itself was nearly treeless. Apparently he was unwilling to accept the judgment of geographers, or the apparent verdict of Nature. He introduced and planted fruit and shade and forest trees. Such was the power of his example or the force of his idea, or both, that more than one million trees were planted in Nebraska on that first Arbor Day seventy years ago.

To assume that Morton's tree planting activities and his promotion of tree planting in a treeless state were

carried on without skepticism on the part of his fellow citizens is to ignore human nature. He faced the skepticism and by demonstration convinced doubters that trees could be made to grow where none grew before.

Perhaps those foresters—latter-day Mortons—had his example in mind when they advocated the Great Plains Shelterbelt, now known as the Prairie States Forestry Project. Begun in 1933 this unique reforestation project, extending through the Great Plains from Texas to the Canadian border, was first denounced as a costly folly and an unworkable experiment. During the past nine years, some 215,000,000 trees have been planted in 19,000 miles of living shelterbelts 100 feet wide on 31,000 farms. Although exposed to some of the worst droughts in history, the early plantings already serve as barriers to scorching winds. They are reducing moisture losses in dry seasons, and they are protecting crops. These trees "that would never grow" have grown an average of three to four feet a year and some are now as much as forty feet in height. It is thus an interesting commentary on the conservation movement that the tree-poor plains region where Arbor Day began should become world famous as the site of one of the greatest tree planting projects in history.

America is still a land of noble trees and rich forests. Paradoxically, it is also a land of denuded forests, eroded soil, silt-choked rivers, and flood-scarred valleys. Few are the ills that afflict this land that are permanently incurable if treated in time. Few are the abuses that trees cannot remedy if planted in sufficient numbers.

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The Guano Birds of Peru

By EDITH M. LAING

THE marvelous economy of Nature is, perhaps, in no instance more completely exemplified than by the amazing sequences of natural phenomena caused by the Humboldt Current. This 100-mile-wide ocean river sweeps up from the Antarctic for 2000 miles along the Chilean and Peruvian coasts. The tremendous displacement of warmer Pacific waters brings to the surface incalculable quantities of decomposed matter. This furnishes food for diatoms and plankton. These microscopic forms of marine life are, in turn, food for inconceivable numbers of anchovettas and other small fry driven to the surface by hordes of larger fish. These smaller fishes are preyed upon by myriads of sea birds.

The guano deposited by these birds on the Peruvian coastal islands has been utilized since prehistoric times by the Peruvians. Since 1840 it has been exported to other countries to enrich the soil, resulting in more abundant crops to nourish man and beast.

A recent Peruvian stamp pictures a family of *guanayes —las aves guaneras,* or Humboldt cormorants. Head, neck, back and wings of the grown birds are a gleaming black, in sharp contrast to the white underparts, and to the icy whiteness of their island rookeries.

Millions of other birds inhabit the islands, mainly the great Humboldt pelicans, piqueros, gulls, tern, and penguins. Island caves reverberate with the bellowing of breeding sea lions.

In the air the *guanayes* are easily distinguished by their undulating flight in streaming files, realistically described by Robinson as being "like a snake dance on the wing, stretching into infinity".

A friend of mine, who has lived twenty-six years in Peru, tells me that at dawn small groups of birds, believed to be scouting parties, leave the islands and fly out over the ocean. Presently they return, and then the millions rise and begin to stream out after the fish. The islands, black with the mantle of birds at nightfall and dawn, during the day glisten like icebergs in the fierce glare of the sun upon the lime-encrusted deposits.

Breeding *guanayes* are said to defend their nests bravely, while most of the other birds there retreat to safety when disturbed. In contrast to the pelicans and piqueros, which hurl themselves like aerial torpedoes and arrows on the swarming fish, the *guanayes* dive from the surface, to swim with wonderful skill underwater in pursuit of their prey.

Due to the use of fish and guano fertilizer, the ancient Peruvians developed the most highly scientific form of agriculture on the American continent. Under the Incas, each district was assigned certain guano islands. To set foot on them during breeding seasons, or to kill the birds at any time, was punishable by death.

A dark page of history recounts the cruelty of the guano workings in the early days of their commercialization, when wretched slaves toiled under the lash until released by death. Today the deposits are worked by steam shovel and loaded on ships by other labor-saving devices. The islands are carefully worked in rotation, and sharpshooters are stationed to protect fledglings and eggs from vultures and condors, and baby swimmers from the sea lions.

A recent fear of the Peruvian government that the birds were diminishing in numbers has led it to engage a group of scientific investigators from this country to study the situation. Peru cannot afford to neglect such a principal source of wealth.

PENTSTEMON COBAEA IS A STRIKING PLANT

The blossoms are large and are a soft lavender with purple markings. The foliage has a sparkle to it. The Ozark variety is distinguished for its large royal purple flowers of outstanding richness

Plants from the far corners of the world meet and prosper in a—

New Jersey Garden

By ANDREW S. WING

Garden Editor, Nature Magazine

WHILE our government has been accumulating a hoard of gold and burying it in the Kentucky hills, Rex D. Pearce has been quietly collecting plant treasures and growing them in his nursery near Moorestown, New Jersey, not far from Philadelphia. Some of these seeds are worth their weight in gold, and to lovers of rare plants they are infinitely more desirable.

Rex Pearce's garden of thirteen acres would not stop a speeding motorist. It makes no show from the highway. But one who will pay a visit during the growing season will come away impressed with the interest and beauty of the more than 3000 species of flowering plants that grow in the fifteen miles of plant material rows. If one is fortunate, he will be shown around by the plantsman himself. Travelling at a fast pace, Mr. Pearce talks at a rapid rate, pointing out the special features of plants as he passes and rattling off botanical names faster than most of us can assimilate them. But with a catalog in hand one can make notes as one goes through for future reference, and the plantsman will patiently pause, when requested, to tell more of the interesting history of special plants, or to explain the culture of any that require special treatment.

Old Orchard Seed Farm and Nursery is really a botanical establishment, albeit a commercial one. No one but a trained botanist could carry on such a business, and few indeed are the plantsmen in this country who even attempt to operate on such an ambitious scale. To appreciate what such a business means one must realize that most of the plants listed in the Pearce catalog are species not carried by the seed trade generally. Many of his specialties are listed by only a few dealers in this country or abroad. In addition to growing seeds, bulbs and plants for his own customers, he also grows seeds for other seed firms.

The international traffic in seeds and plants is considerable in normal times, but has been greatly reduced by the war. Many of the usual sources of supply have been cut off. Mr. Pearce smiles as he tells you how he used to ship to a certain English firm as many as seven hundred different seed items every year for resale to their customers, many of whom lived within the Philadelphia suburban area. In fact this firm made a practice of settling its accounts partly in American checks, many of which were

drawn on Philadelphia banks. Recent events have made this international trade difficult, where not impossible, and American firms are now selling direct the products that they formerly distributed to domestic customers by way of England.

Before the war Rex Pearce was in touch with about one hundred botanical collectors throughout the world. In addition he did quite a bit of collecting himself in this country. His collectors were of all kinds and all stations in life: a world-famous botanist; amateurs with a botanical slant; missionaries; agents of mercantile firms; wives of army officers; British consuls; and various other individuals stationed from the lowlands of New Zealand to the Mountains of the Moon in Africa.

Some of these collectors are skilled botanists capable of following their own noses to desirable specimens, but others have been directed to plant prizes by Mr. Pearce from descriptions given by other plant explorers. Plant prospecting is as old as the hunt for gold, almost as exciting and often more rewarding in satisfaction if not in cash returns.

When he is not "busy" in his own establishment, Rex Pearce likes nothing better than to sneak out for a day or so of collecting in nearby wilds. These trips have covered territory from Florida to Maine but have been mostly in eastern Pennsylvania and southern New Jersey. For a number of years he spent about a day a week at this pleasant work. Gradually, however, domestic sources have dried up, due to the inroads of civilization. In some cases the work of C.C.C. camps, which was supposed to be of a conservation nature, actually destroyed native stands of plants that Pearce had been watching for years. On these trips he never collects plants for resale but simply marks the stations with bamboo wands so that he can locate them when he returns later to collect seeds for propagation in the nursery. When he returns to these stands year after year he feels much like a man would who was visiting old and dear friends. No doubt plants mean almost as much to Rex Pearce as human friendships.

REX D. PEARCE, HORTICULTURIST

The specialist in rare plants and seeds holds a pot of *Pentstemon nitidus*. Photograph by courtesy of American Magazine

Among his plant collectors have been a merchant in former German West Africa who supplied succulents; ranchers and others in Rhodesia and South Africa; a missionary in Mozambique; the botany department of the University of Algiers; the Minister of Agriculture in Cairo, a German doctor in the Canary Islands.

Perhaps the most satisfactory collector that he had was a Chinese botanist who lived at the foot of Kiukiang Mountain and who made trips to distant points in several Chinese provinces. Kiukiang Mountain was besieged by the Japanese several years ago and nothing has been heard of the faithful Chinese collector since that time. Apparently that source is gone forever. Many of the rarer plants of the Dolemite Alps in the Austrian Tyrol came from a woman collector who lived in a Tirolese village. This lady was an ardent supporter of the Dollfuss government and hated the Nazis. She happened to be out of the country at the time of the invasion of the "barbarians", as she invariably called them, so has not been able to return. The Russian occupation of the Baltic provinces lost Pearce some good seed sources, but that has been balanced in part by the cooperation shown by the Soviet Union, which has given considerable support to botanical research and has supplied Pearce with some highly desirable plant material.

From Palestine and Trans-Jordania came annually a supply of native plants, particularly the rare *Oncocyclus* irises, which came from Dr. Dinsmore, one of the greatest living authorities on the flora of the Near East. Interesting material came from private English gardens in that great nation of plant lovers and collectors. Some of the more interesting collectors have lived closer to home in western United States and Canada. Mr. Pearce deplores the fact that more collectors are lost from the death of elderly persons than are replaced by younger persons coming into the field. But the greatest losses of all have been due to the war closing areas to plant collecting or to exportation. Since most of his foreign sources have dried up, he has turned more and more to the harvesting of seed in his own fields.

When I asked Pearce to name some of his favorite flowers he weighed the question carefully before replying. To him all flowers—nearly all plants—have interest, and while he is not unaware of the qualities that make flowers popular favorites, to him the subtler beauties of rare and unusual species offer a stronger appeal. The commercial uses of these plants, their rarity and difficulty of acquisi-

tion, as well as their adaptability to culture in our own gardens—all these points enter into his valuation of them. But certain preferences do crop out in his conversation and his writings about plants.

"To my mind the loveliest of all rock garden flowers," he told me, "is the bitter-root, *Lewisia rediviva,* state flower of Montana. It is low-growing, not over four inches, but the flowers are large for the size of the plants, feathery pure-pink 'water lilies' two inches across, several opening at a time, crowding each other. *Lewisia* grows from tubers, which must be planted in full sun with good drainage and abundant moisture underneath. It grows well from seed planted in late autumn where it will have full winter cold.

"Blazing Star and Kansas Gay Feather are common names for *Liatris* of which there are a number of species, all natives. It is odd that the showiest of all the species should be *L. elegans,* the one with the largest flowers, but the least known. The plants grow to thirty inches, and the petals are violet centered with white with long, curving stamens. There are many stems to the plants, opening in flaring vase form. A fine perennial for the mixed summer border. *Liatris* seed is slow germinating unless given a long exposure to cool soil.

"Plants are like persons, neither wholly good nor wholly bad by any standard. Ratings, too, must be individual, for what is a garden treasure to me may be just a weed to my neighbor. A weed, you know, is just a plant we do not happen to want in the place where it is now.

LILIUM LONGIFLORUM

This is the Takesima variety of true Easter lily with immense trumpets of pure white. It is delightfully fragrant and is a garden lily of true winter hardiness

AGAPANTHUS OR AFRICAN LILY

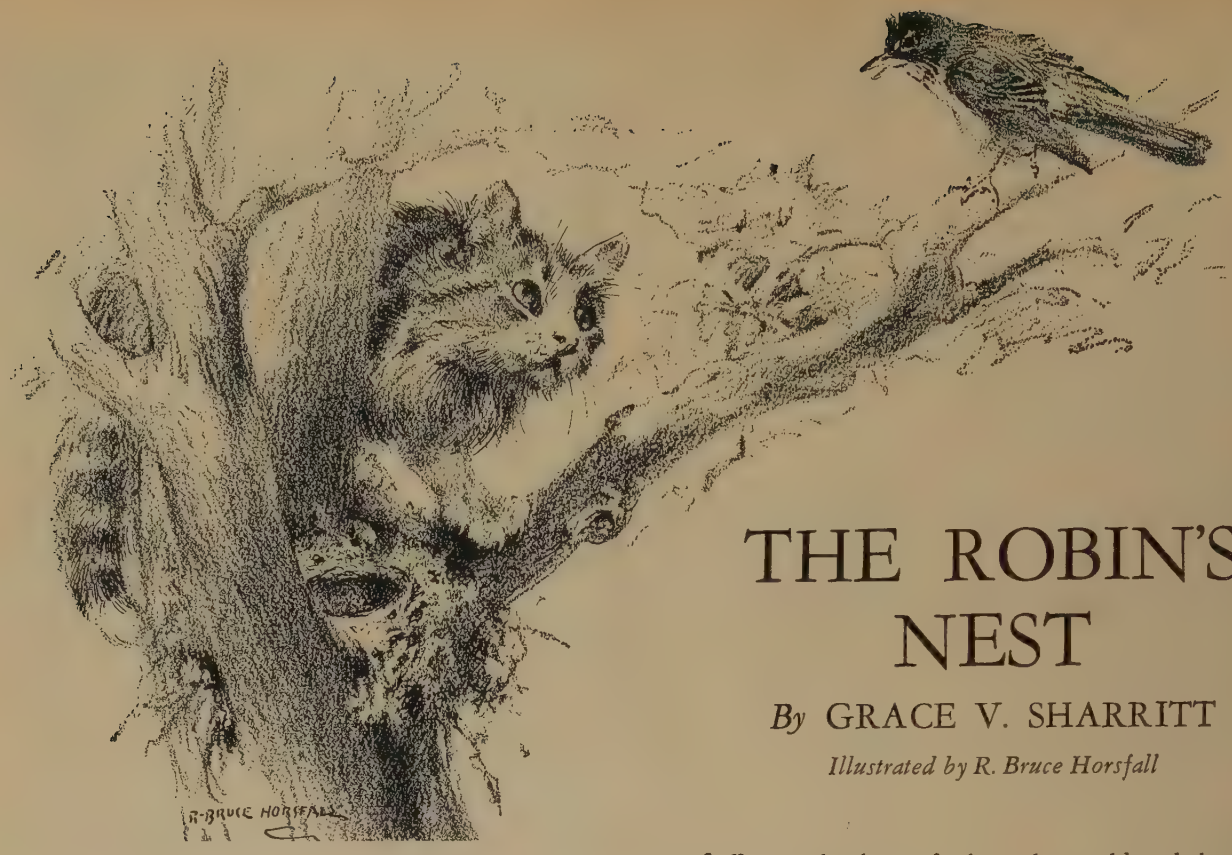
This is a spectacular snowy giant that is easy to grow, has a sweet fragrance and blooms ranging from amethyst to indigo with, rarely, some of the purest enamel white

"Here's a bit of an oddity: the half-vine that is *Aconitum uncinatum,* another American native. Unlike the other monkshoods that one commonly sees, the stems will not support themselves. Plant it in the edge of shrubbery and it will clamber over and through the bushes, showing the deep violet, helmet-shaped flowers in the open just as it does in Nature. It requires a long period of cold exposure in soil to germinate, and while it likes shade, it also demands a rich, moist soil unencumbered by tree roots.

"Agapanthus, the African lily or blue lily of the Nile, is not hardy but it can be used in the border. The flowers are borne on long stems up to four feet, and may have as many as 160 blossoms in a single cluster. The colors range from snowy-white through lilac to sky-blue, indigo and violet, and the plants vary much in height, habit and season. Very handsome and easily grown from seed. The plants can be grown in tubs or taken up and stored indoors in winter.

"No rock garden is right without the snowy whiteness of *Arenaria,* and of the arenarias the one most often seen, *Arenaria montana,* is still unsurpassed. It prefers full sun, is fully hardy and is easily grown from seed.

"Although most of the truly alpine columbines are what the English call 'miffy', there is one from the Orient that is fairly easy and at the same time the loveliest of the alpine species. It is *Aquilegia akitensis,* first columbine to flower in spring, lasting until June. The plants are ten inches high, with silver foliage, the flowers being cream and violet, tipped olive. Plants (Continued on page 215)



THE ROBIN'S NEST

By GRACE V. SHARRITT

Illustrated by R. Bruce Horsfall

I WATCHED her build her nest. It was in early May that I first saw her fly across my window, her slim breast red and beautiful in the morning sun. In her beak she held a few brown grasses, which she carried to the crotch of the maple tree neighboring my porch. The outer wall of her home was finished. These grasses were for the lining of the nest, soft and pliable to bed her young.

Throughout that entire cool May day she flew from the vacant lot across the street to her home in the tree carrying these grasses. They had to be tucked into the nest just so! She made a lot of work of it, smoothing the grasses into the symmetry and roundness that she desired. This she did by crouching down in the nest and moving her body against the interior, molding the nursery into shape.

Three or four days passed. Now the leaves on the maple were a green screen around her home in the crotch of the tree. The day was hot as she brooded her eggs. Occasionally she would leave the nest for a little refreshment of worms across the street. Then, and not until then, did I see her Squire. He did not brood the nest, but he kept close watch from the porch roof.

On the morning that the temperature dropped to a frosty degree, she stayed with her clutch without any time off for luncheon. I could just see the top of her red breast through the dense leaves. Once, when her head was raised in alarm, I noted the thrush-like streaks upon her throat. "She must be tired," I thought. It had rained during the night. A cold rain.

Occasionally she would turn the eggs with her bill. Then, fluffing out her breast feathers, she would settle herself upon her unhatched offspring to brood again. The sky her roof, the tree her citadel. Anyone seeing her thus would want to shield her; could never harm her or her young.

There was an interval of two weeks. During that time she kept her secret carefully, winging silently to get quick refreshment, winging swiftly in return. During these days, her mate would reassure her of his comforting presence from the housetop or porch-railing, with a low "cheer-up, my darling". The days were quiet, pregnant with hope.

Then one morning I heard his song in full glory from the housetop across the street. The victorious song of cock robin! The male congratulating his mate!

Such activity as the green branch on the maple saw then! What a fluttering and flying from tree to the earth where harbored grubs and choice foods for hungry babies. What tirelessness and vigilance from both parents!

Less than one week later tragedy visited her. It happened in the smoky dusk of twilight. I heard her pitiful call; then her mate's shrill cries.

Then a mild human voice said, "Come here bad cat, you mustn't catch birds!" Then a mewing sound. Then pleasant laughter.

The robins left their home in the maple tree neighboring my porch. I do not know where they went. The cat was not to blame. He was following the primitive feline instinct of his kind—to prey. It is they who allow a cat to prowl at nesting time who are negligent and blamable.

JEKYLL AND HYDE

By OSCAR OSTLUND

The house cat is angelic,
When reposing on a rug;
But prowling, sly, in haunts of birds,
No better than a thug.

Long study, inspiration, and many hours of labor painted in flowers—

The Last Supper

By FLORENCE HORN BRYAN

At Laguna Beach, where the blue Pacific is usually as calm as a psalm of David, the artist colony feasts upon flaming sunsets that transform the ocean to molten gold. Man cannot live with such grandeur without envisioning magnificence. Such must have been the inspiration that moved Harold Reed, business man, world-war veteran and homesteader, to conceive the idea of reproducing Leonardo da Vinci's masterpiece, "The Last Supper", in flowers.

He envisioned a perfect picture—the figures a little larger than life-size. So, for a year he roamed the hillsides, the coast line and the forests, considering every weed; looking at every blossom. After months of wandering alone in quiet places, he was ready to paint in living flowers the picture that was to awe and silence the million and a half people who would see it in the Pasadena Rose Tournament of 1941.

The possibility of attack by air led to the cancellation of the Pasadena Tournament of Roses for 1942. However, the contribution to the 1941 Tournament parade described here was so outstanding that its inspirational value seems to justify its publication in a time like this.

As he searched, his vision began to take form. Wild buckwheat recommended itself for the skin texture of the thirteen faces. Coxcomb would fashion the robe of Christ. Rock moss from the dead wood of pine tree and from the shore line would be used for the vests of the twelve disciples, the overlying robes to be made of Mexican firebush and certain varieties of pansies. The castor bean pod could supply the deep reds, and heather make a perfect background. Cockleburs would make the food upon the table. Veronica, gone to seed, could be eyebrows.

The artist, Owen Holmwood, first made a mural copy

of the painting forty-five feet long and twenty-four feet wide. With the help of his wife he laid on the thousands of petals that formed the hands and faces, spending hours on each to attain a faithful reproduction. Fifteen shades of statice, combined with Cecil Breuner rose petals, brought the features to completion.

Then eighteen men worked a thousand hours making a frame of golden brown chrysanthemums. A third dimensional effect was given with bougainvillea and many of the forty other varieties of flowers selected by Mr. Reed.

All night they worked, placing two hundred and fifty thousand pure white chrysanthemums in the curtain to hold the blazing cross of two thousand sunburst roses. Lavender sweet peas formed the border.

Morning dawned. An expectant throng was waiting; people of the sixty communities that had entered floats; the flower lovers; the boys who had slept all night under the bleachers to be sure they would be there; the old people who had sat on boxes most of the night to avoid the heavy traffic over the highways. Great crowds jammed the pavements and sidewalks; thousands were in the grandstands and the windows of three miles of stores.

The Queen of the Tournament appeared. The parade started. Two hours passed. When the throng had almost reached the point of satiation by surprises and beauty—when many were about to go—all were held motionless and speechless. Heads were uncovered. There was a reverent hush.

"The Last Supper", hushed voices exclaimed.

It moved past them and was gone. Still the multitude remained in their places. Then such an ovation burst forth that Harold Reed, hidden under the flowers with the driver, knew that his year of searching alone in quiet places for gifts of Nature had been time well spent.

•

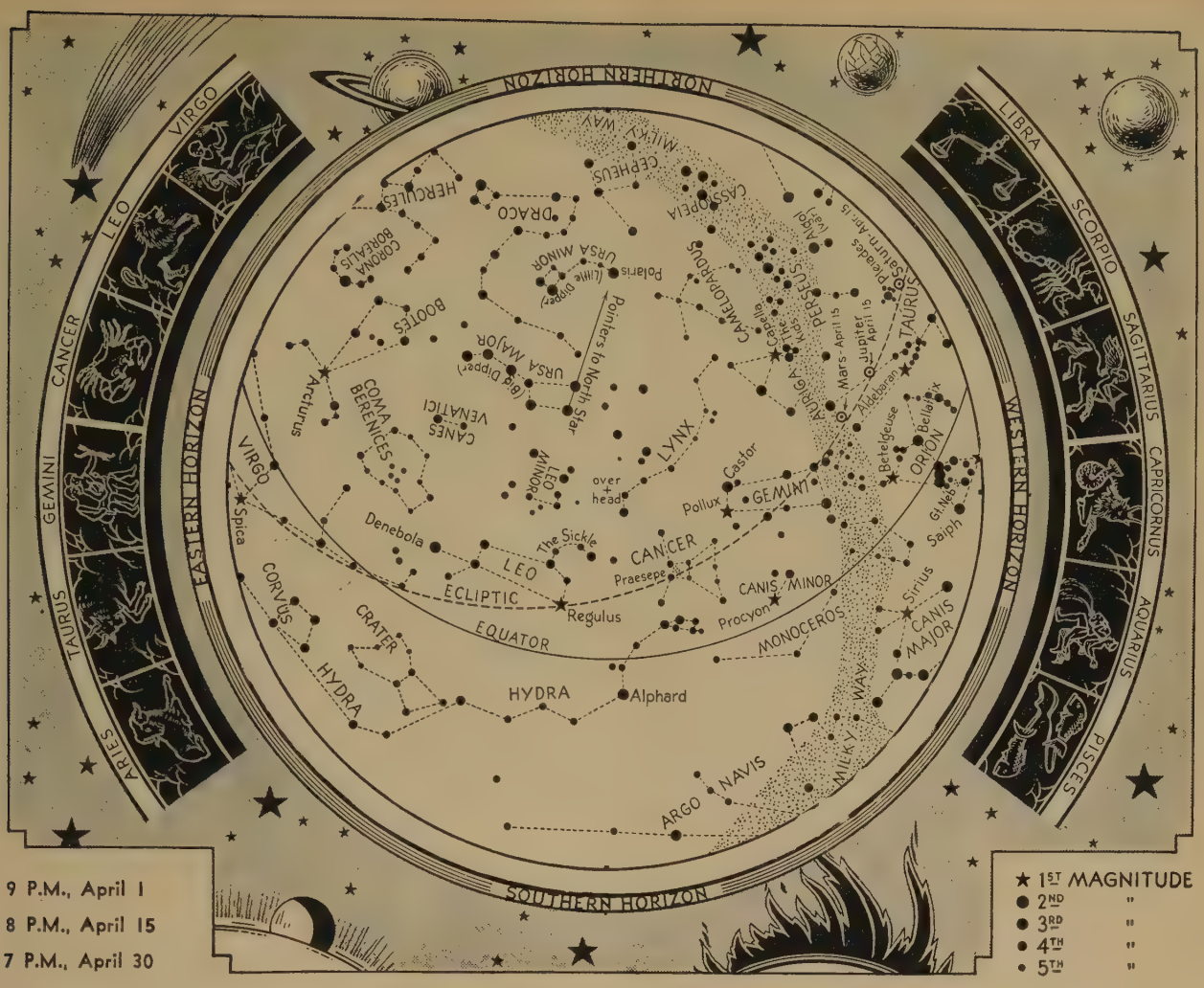
More "Funnies" from the Nevada Great Basin

By VERNON BAILEY

DEEPER excavations in the canyon where the original "Funnies" (reported in the January, 1941, NATURE MAGAZINE) were discovered have brought to light more ancient types of animal life extending back to the age of dinosaurs, and including some of the early mammal types no longer found on this continent. They are the cause of much speculation, especially by the younger scientists, and their study is to be continued for at least another year. There is a striking similarity in their structure to the cones of pine trees, which gives them a highly protective armor of scales and spines. Their legs, tails and horns have a soft furry covering over twisted metallic cores somewhat like the gadgets commonly known as "pipe cleaners." At the present time their joints are extremely rigid and seem to be held in place by a hard, waxy substance resembling sealing wax.

The final report on the relationships and geological position of these strange creatures will not be published until further excavations are completed, but these advance notes are furnished by Faith Cowgill of Reno, Nevada, and some of the best restorations have been photographed by Laura Mills of Fallon, Nevada.

These strange animal forms probably ranged widely over North America, and it seems strange that they have not been discovered elsewhere. They may well have been overlooked, or not recognized if encountered. It would be well to keep careful observations, as much of the interest of prehistoric forms centers around their distribution. These notes are published with the purpose of stimulating observation and the "seeing life" that detects the unusual and obscure in our environment.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

Navigation by the Stars

By ISABEL M. LEWIS

A KNOWLEDGE of the names and positions of the chief constellations and their brightest stars is no longer merely an interesting little bit of information that we may have picked up as a hobby. It has become a matter of vital importance to many thousands of men who need to acquire this information speedily and thoroughly. In piloting planes on long flights over land and sea, in steering the course of a ship across the seas, knowledge of the sun, moon, stars, and planets is essential to the successful completion of the trip. Lives of men adrift at sea have been saved because some have known the stars. Many astronomers today are busily engaged in giving this information to aviators.

Celestial navigation, as it is called, is not difficult if one masters a few simple facts about the stars. One should know the names and location of all of the twenty brightest stars in the heavens—and a few more—and also the brightest planets. Venus, Jupiter, Mars, and Saturn will be used constantly whenever available—Mercury more rarely—and one should *know* them. To keep track of the planets from day to day, once they have been recognized, is simple because of their distinctive colors and brightness and their change in position with respect to the stars. Venus far outshines all stars and planets, and it will always be seen either in the western sky after sunset, or the eastern sky before sunrise. One should never mistake this planet for any other stellar object.

Jupiter comes next in brightness and also outshines all stars. It is best recognized by the fact that it is a deep yellow and its light never flickers. It has been said, of course, that planets can be distinguished from stars by the fact that their light does not flicker or scintillate. This is not always true. Mercury flickers noticeably at times when near the horizon and so do Venus and Mars, occasionally;

Jupiter practically never. Saturn is a pale yellow, generally comparable in brightness to Capella or Vega. Mars varies greatly in brightness according to where it is in its orbit with respect to the earth. It cannot always be distinguished merely by the fact that it is reddish in color. There are times when Mars is near Antares, which is called "Rival of Mars" and does at times rival this planet in color and brightness. Mars can be mistaken for Antares, and when near Aldebaran might be mistaken for it.

The safest procedure with respect to the planets Saturn and Mars is to identify them once and for all and then keep track of their motions. This is not difficult with Saturn, which does not move more than a few degrees a year, remaining for months in the same constellation. Mars moves more rapidly, but is easily followed in its journeys.

The planets will, of course, disappear for varying periods of time when they come into conjunction with the sun and these conjunctions should be kept track of. When a planet draws nearer to the sun in the western sky on successive nights it approaches conjunction with the sun.

Most of the brightest stars are identified by some peculiar configuration in which they appear, by their distinctive color and brightness, or by their general position in the heavens. Navigators, unlike those who observe the stars for pleasure only, make their observations at all hours of the day and night. Even then there will be times when familiar constellations, such as Orion, or Gemini, get too close to the sun to be observed at all and disappear for a time. Constellations cannot be observed "in their seasons" alone. Fall constellations may be observed in the spring before sunrise and winter constellations after midnight in the early fall. One must know the constellations of both the northern and southern hemispheres and be prepared to identify them at all hours if one is to use them in navigation. The easiest way to identify the brightest stars is to locate them with respect to some well-known constellation, or some bright star such as Spica, or Vega, or the Big Dipper, in Ursa Major, or Pegasus, in the northern hemisphere, or the star Acrux in the Southern Cross in the southern hemisphere.

Star groups near the equator or zodiac are available in both hemispheres for observation, although to northerners the familiar constellation of the northern hemisphere are seen in inverted position when they are viewed from the southern hemisphere. Some easily identified stars are Polaris, the Pole-star; all of the seven bright stars in the Big Dipper; Vega, Capella, Aldebaran, Sirius, Regulus, Spica, Antares; Acrux in the Southern Cross; and Canopus. We might add others to the list. All of these stars are associated with other stars, or groupings of stars, in such a way as to make it easy to identify them. Polaris, of course, is identified by the Pointers. Aldebaran is in the V-shaped group of The Hyades; Capella has near it the little triangle formed by The Kids, and Vega has two faint stars near-by to form a little equal-sided triangle.

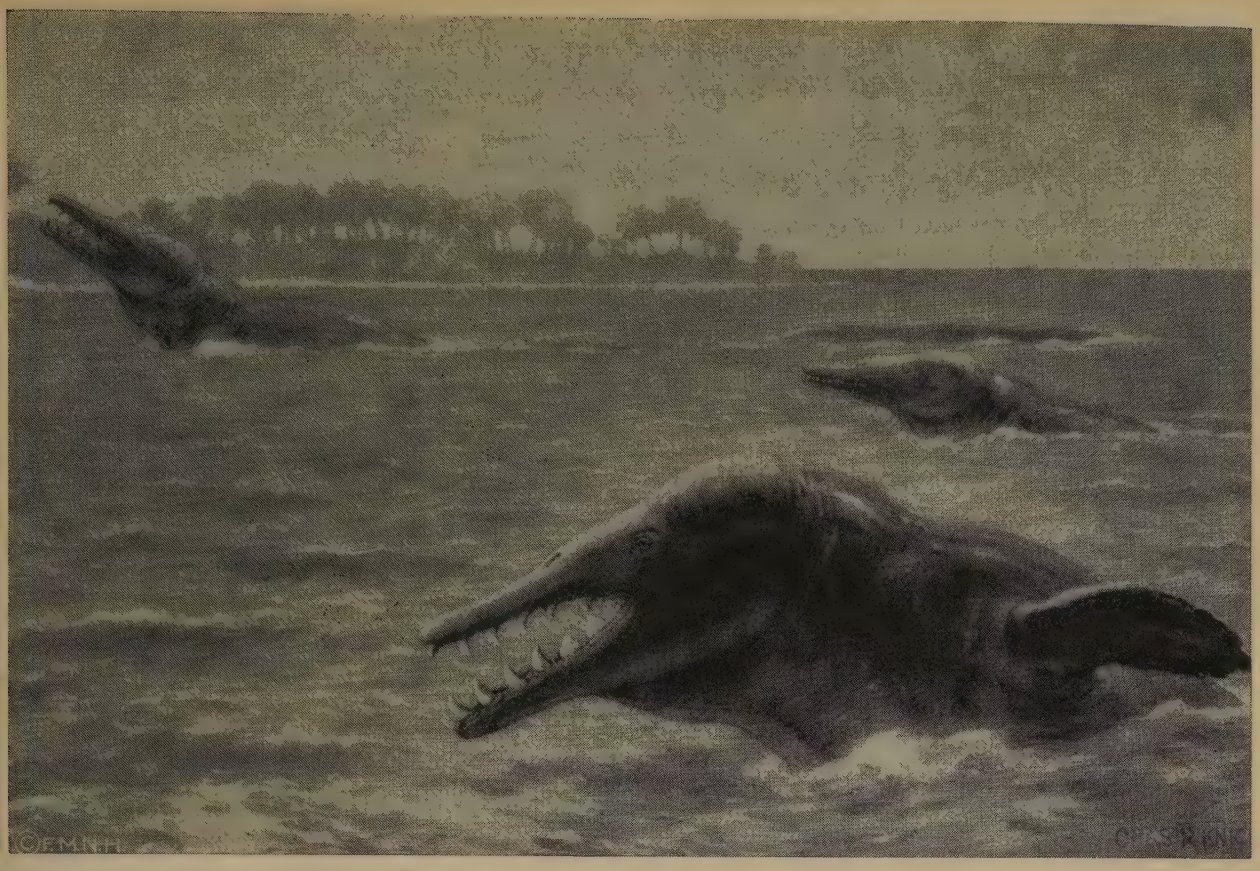
Navigators prefer the names of the stars, even the Arabic ones, often difficult to pronounce, to the Greek letters and Latin names of the constellations. Alpheratz is used in preference to Alpha Andromedae, and Dubhe, instead of Alpha Ursae Majoris, to mention two examples.

Star maps and atlases are essentials until one has mastered the names and positions of the brightest stars, which is not, after all, such a difficult matter. There are also many tables and charts to make celestial navigation an easy matter for the navigator whether he is on the sea or in the air. For seamen and the ships of the Navy there is the Nautical Almanac, and for aviators the new and convenient Air Almanac, both published by the Nautical Almanac Office of the Naval Observatory.

Navigation by dead reckoning is possible for short distances only, both on the sea and in the air, and for long voyages and flights celestial navigation must be employed as a frequent check on position, by day and night. The sun and, at times, the moon, Venus, and Jupiter are available by day and the stars and moon by night. The procedure is extremely simple and with a little practice a "fix" of position can be obtained in about three minutes. The most difficult part of the process for the beginner will be the mechanical manipulation of the sextant; but this becomes easy with practice. In addition to a sextant an accurate watch, or chronometer, showing Greenwich Sidereal Time is required; also the Nautical Almanac on sea, the Air Almanac, for the current period, for air navigation, and tables and charts for plotting position.

The procedure is generally to observe with the sextant the altitudes of two bright stars and note the exact times of the observation. These two altitudes determine circles of position at known distance, equal to 90 degrees minus the altitude, in each case, from the star. The observer must be on each of these circles, it can be shown, and therefore he must be at one of the two points of inter-section. As the position is known roughly there is no question as to which of the two points of intersection is the correct one. The observer then has a line of position. In order to obtain it he had to identify the two stars, read their altitudes with the sextant, observe the time of observation, plot their positions from data obtained in the Almanac and draw the circles of position. These data with the additional information as to the Greenwich Sidereal Time shown by the watch gives the navigator his longitude and latitude. To obtain it the observer had to identify the stars that he used before he could find their positions in the Almanac, which brings us back to the fact that a knowledge of the names and positions of a score or more of the brightest stars in addition to the positions of the sun, moon and planets are among the first essentials of celestial navigation.

Venus continues to be the brightest object in the morning sky this month and reaches greatest elongation west of the sun on April 13. On April 11 a daytime occultation of Venus by the moon will be visible in the tropics. Mercury is too close to the sun to be seen this month. It will be in superior conjunction with the sun on April 20, then passing to the evening sky. Jupiter is now a brilliant object in Taurus. Mars also is in Taurus and in conjunction with Jupiter on April 3. It passes into Gemini later in the month. Saturn is drawing nearer to the sun but may be seen in the evening sky the first half of the month.



THE MIGHTY TOOTHED WHALE OF THE EOCENE

It lived in the seas of the southern United States. This restoration is by Charles R. Knight and is reproduced by courtesy of the Field Museum of Natural History in Chicago

Those who can read the story of fossils in the South tell—

Tales of Ancient Whales

By KATHERINE V. W. PALMER

". . . That colossal and terrible reptile the SEA SERPENT, which when ALIVE measured thirty feet in circumference."

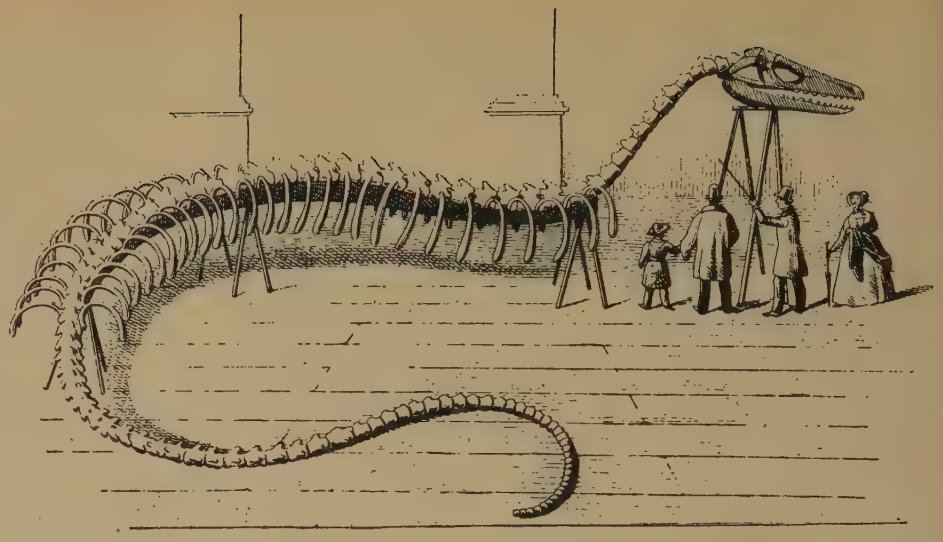
Boston, in the fall days of 1845, was enlivened by such lurid placards posted throughout its principal streets. The public was informed that this "Hydrachos" or Water King was the Leviathan of the Book of Job. The Cabots might "speak only to God," but the people of Boston could see a stupendous exhibit of Divinity's own design.

The New Yorkers were also privileged to view the sea monster, and Barnum, with all his tricks, could not have made a display more dramatic than that which was given the "great sea serpent" in the Apollo Rooms on Broadway. Its "personal appearance" was drawn by one of the artists of the New York *News,* and his illustrations headed an article about this "scientific wonder".

The skeleton of this serpent extended 114 feet in length and weighed 7500 pounds. It had been concocted by a German, Dr. Albert Koch, who, on the other side of the Atlantic, had heard of a rich graveyard of fossil bones in Alabama. His journey to the South was rewarded by several wagon loads of enormous specimens and from them he constructed a gigantic skeleton.

Koch gained widespread attention in the newspapers of the day, but many scientists were sharply critical. They showed that the "sea serpent" was a mixture of bones of at least five individuals that are now included in three different genera of animals. The critics indicated that many bones were in the wrong place, that some parts were not bones, and that the teeth were those of a whalelike mammal and did not belong to a reptile.

All the scientific denunciations did not bother Koch, for why should he desert a "goose" that eventually laid him a "golden egg." He exhibited his mount in the important cities of Europe and finally sold it for a yearly pension of 1000 Reichstalern to King Frederick Wilhelm IV for the Royal Anatomical Museum of Berlin. At this same time a group of German scientists wrote a memoir



HYDRACHOS OF KOCH
This "sea serpent" was an assemblage of the bones of at least five individual animals of three genera

on the creature, continuing to designate it as reptilian. However, the error was rectified by a German savant after a careful preparation was made for the Berlin Museum.

The first discovery of huge bones similar to those that Koch exploited was made in 1832, thirteen years before the debut of the German doctor's monster. A Louisiana country judge, named Bry, rescued twenty-eight fossil vertebrae, each about fourteen inches long and seven inches broad, from the fate of use as andirons in some country home. The relics had been unearthed from the hillsides along the Ouachita River in eastern Louisiana from sediments that were of the latter part of Cenozoic time. The Judge, being of an inquiring mind, shipped the specimens to his friend, the president of the Philosophical Society of Philadelphia. That learned group voted to request Dr. Richard Harlan, a Philadelphia physician-naturalist, to describe and name the beast to which the fossil backbone had belonged.

Because of the enormous size of the fossils, Harlan reasoned that the animal from which they came must have belonged to some giant, extinct, marine reptile. He saw differences between the bones of this colossus and those of the plesiosaurs, the forms of life that he considered the nearest relatives. He pictured the creature as twice the size of and different from the known lizardlike animals of the past. He, therefore, named it—"*Basilosaurus,* king of the lizards." The marl in which *Basilosaurus* was found was deposited around 40 or 50 million years ago while the plesiosaurs and ichthyosaurs of the Mesozoic era reigned over the earth from about 30 to 130 millions of years before.

In 1834 and 1835 another scientifically-minded southern gentleman, Judge Jonathan G. Creagh, sent more fossil bones from near Claiborne, Alabama. These were passed on to Harlan who believed them to be similar to those of his "king of the lizards." Still placing the ancient giant among the reptiles, the Doctor, a true scientist, five years later took the fossils with him to England. There they were carefully studied by Sir Richard Owen, the celebrated anatomist and paleontologist. Owen particularly examined the teeth and proved that the animal to which they belonged was not a reptile, but a sea-going mammal related to modern whales. The rear molars appeared like two simple teeth linked together, a condition which suggested to Owen the name zeuglodon. This name seemed more appropriate to the two Doctors, and Harlan agreed to forget his appellation and use that of Owen's. Thus the "king of the lizards" became the "yoked-tooth mammal." However, there is a rule among those who classify animals that the first scientific name applied definitely to an animal must be the proper one to use. Therefore a gentleman's agreement between Owen and Harlan could not change the first name for their fossil creature. Nevertheless, paleontologists, when talking informally, still call the beast a zeuglodon.

Most of the bones that Harlan took to Europe and the original specimens from Louisiana may be found today in the Academy of Natural Sciences in Philadelphia. Some of the early discovered zeuglodont material is in the United States National Museum in Washington, D. C., and one specimen from Alabama has been mounted in that museum for more than 25 years. Part of that restoration was displayed at the Atlanta Exposition in 1895.

A more complete set of remains of *Basilosaurus,* consisting of a part of a head, portions of the limbs, ribs and backbone about 65 feet long, were shipped from Alabama to Albany, N. Y., in 1842. Later that set was sold for 300 dollars to Dr. John Collins Warren, an eminent physician-naturalist of Boston. In 1906, it was acquired by the American Museum of Natural History in New York City.

Because of the success of his first venture, and suffering from no inhibitions in regard to the propaganda concerning his "water serpent," Dr. Koch came back to Alabama in 1848 to make another "lucky strike." He dug up a skeleton of *Basilosaurus,* which he shipped to Dresden, Germany. From there he toured, with his fossil protegé, that city, Breslau, Vienna and Prague. Afterwards, in 1853, he returned with it to the United States and exhibited the skeleton in New Orleans. After New Orleans, Koch took it to St. Louis and later sold it to Edward Wyman of the Curiosity Shop in that city. Later the restoration was taken to Wood's Museum in Chicago, where it was destroyed in the Great Fire in 1871. Thus the various collections of zeuglodon bones have had a glorified past as museum troupers.

The collecting of these fossils is not limited to the past, nor has all the fun of this "big game fossil hunting" been exhausted. Basilosaurus bones are still picked up in Alabama, Florida, Mississippi, Louisiana and Georgia. Many are sent to museums. In 1938, (Continued on page 221)

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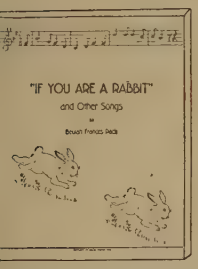
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NEW JERSEY GARDEN

(Continued from page 207)

grow readily from seed sown in spring or autumn."

A visitor to the Pearce nursery will find much to attract him. Spring is the best time as there are then more species in bloom. But even in late summer or late autumn there will be at least a couple of hundred flowers in bloom, many of which will be new to even experienced gardeners. Among the attractive plants that caught my attention were: Star of Texas, *Xanthisma texanum,* a rich yellow daisy; *Belamcanda flabellata* or butter-iris, from Japan, a soft primrose yellow, and many others.

Rex Pearce was born on a southern Wisconsin farm on Bigfoot Prairie. His parents had both been trained to teach school but his father turned to farming and horticulture. After graduating from Janesville High School and Wisconsin State Teacher's College, Rex went to northern Idaho where he worked four years near the Canadian border as a school teacher. There he bought a small ranch, which he operated while he continued to teach school, growing flower and vegetable seeds on contract. His instinctive love for plants asserted itself and he became very much interested in the native flora. Returning to Wisconsin, he ran a small seed store for a time and then joined the L. L. Olds Seed Co., in Madison, becoming eventually manager of the flower seed department. His next venture was into the nursery business, specializing in ornamentals, including the rarer kinds. All this time he was studying plants, learning how to grow them, and increasing his knowledge of world botany.

Leaving the nursery in the hands of a partner, he moved East to join the old firm of Henry A. Dreer in Philadelphia, as assistant manager of the flower seed and bulb department. His insatiable curiosity and love for the unusual kept him everlastingly busy in his spare time, growing rare plants in his own garden. Eventually his backyard collection overflowed into nine neighboring gardens and vacant lots. Here were grown mostly rock plants and alpines. When his firm received calls for plants that they did not carry, Pearce could frequently supply them. Eventually he listed his collection in a catalog of his own and before long his sideline business had grown to such a volume that he had either to give it up altogether or devote full time to it. The decision to devote all his time and energy to this absorbing hobby did not, one can imagine, cause him to lose much sleep, although it did involve business risks.

Although very businesslike in the way he does things, Rex Pearce is really more of an horticultural career man. During the growing season he spends much time in his nursery supervising the growing of plants and harvesting of seed. In winter he works day and night on his catalog, and there is always a large correspondence to handle. Trained botanists are included in his field and office staff. There are few men who would work so hard or such long hours at a purely commercial business. It is a point of pride with him to be accurate in all things, and he is constantly in touch with botanists and botanical gardens here and abroad. When the war is over he will renew his distant contacts; meanwhile his warehouse and nursery are a virtual treasure house of rare and valuable seeds and plants.

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THE SCHOOL PAGE ★★★

EDITED BY DR. E. LAURENCE PALMER

Professor of Rural Education, Cornell University, and Director of Nature Education, The American Nature Association

Air Supremacy in Nature

With the coming of the warmer seasons, we will hear more and more of the importance of the supremacy of the air. We may call members of the different enemy nationalities by a variety of derogatory nicknames, but if they can master the air in our skies, they may well make us eat our words. And if we can master the air in their skies, we may be masters of our own fates.

In view of this interest in those who travel the skies, we should do what we can to understand and appreciate the creatures that already had mastered it when our ancestors lived in caves. Who can dispute the fact that the birds of prey, among the creatures that fly across our skies by night or by day, in a sense rule the airways.

To many, these master birds are thought of as vermin. To others, they are the most marvelous of creatures. Prejudices, one way or another, are already established in many at the elementary school age. With youngsters the learning of the research laboratory will, in many cases, conflict violently with the folk-lore of the home. Diplomacy will be required if the younger generation is to develop a rational attitude regarding birds of prey in the face of the prejudiced opinions held by their elders at home. In a sense, education regarding the importance of hawks and owls may be as dangerous to local harmony as might be the teaching of sex, politics, or religion. In the case of the hawk-owl problem, however, there is much concrete evidence at hand to support the convictions of the researcher. If the teacher can, then, establish respect for the findings of science by winning local battles against "vermin campaigns," which may have some popular support, it may be easier to win more important battles in which blind prejudice may be an important factor. The movies, the radio, the blatant elements in the press, and especially, the popular magazines—all may lend their influence to strengthen false popular impressions, but these should be countered by sane educational work, especially in the schools. If there are vermin campaigns locally, then start a group interest in falconry. If the lurid press tells of eagles carrying away half-grown humans, then let us counter in the more conservative press with stories based on the findings of the ornithologists that our eagles in the United States can probably lift nothing into the air that weighs more than fifteen pounds, although heavier weights may be dragged along the ground. If there are vicious rumors about the damage done by birds of prey, then let's begin to talk about Hawk Mountain, falconry, Errington's reports on vermin campaigns in the middle West, and the Fish and Wildlife Service reports on birds of prey throughout the country.

If the teacher must conform to the popular idea that children in the elementary grades must study about life of the past, then the insert in this issue of NATURE MAGAZINE gives notes on the antiquity of some of our commoner hawks and owls. If we must use our Nature study only as a servant for such subjects as geography, then the same inserts give help in studying the summer and winter range of these same species. If we happen to be a sentimentalist or a philosopher, the general text of the insert will tie these animals into the prose and poetic literature of this and of other lands and times. If we seek beauty, we will find it in the birds themselves; and if we seek a challenge to our intellect, we will find it in a study of their food habits to help us determine their economic importance in our own community. Help in confirming our own observations will be found in the data supplied by others and reviewed in the insert. Here, then, is a real opportunity for a broad educational experience, dynamic, important, interesting and practical.

For the busy practical teacher, it might be well to list a few specific things that may be done in the study of these birds, things calling for first-hand observation and things using the data supplied by the findings of others. Here are a few:

Make a survey of the hawks to be found locally and locate on maps the time and place where each has been seen by members of the school. Do the same for the owls.

Make a drawing of a hawk or owl, and point out the usefulness of the beaks and talons for getting the food upon which they live.

Make collections of the "pellets" regurgitated by some of these birds and break them open to show the abundance of mammal bones, hair and other undigested substances. Evergreen copses in cemeteries are often excellent places to look for these pellets.

Make collections of pictures of falconry and prepare accounts of its importance in various nations at various times. If possible, make an exhibit of the harnesses and other equipment used in training and using a falcon.

Learn which of the birds of prey are protected by law in your state, and determine if your state recognizes the importance of these birds as do others.

From books, or from observing the birds in the field, draw and color cardboard representations showing how the different species look from beneath when they are in flight. The National Audubon Society has some excellent literature on this. Make tailless "Malay" kites covered with transparent cellophane and bearing the cardboard representation of some hawk. Fly the kite and notice how it resembles the bird. Suspend a collection of the cardboard representations from the ceiling of the school and give the children opportunity to recognize quickly the fieldmarks of the different species.

Draw circles and divide them into sectors indicating the percentage of birds, mammals, insects and so on that are reported as constituting the food of these birds. Make charts of these circles and supplement them with drawings of the birds, either made directly from the birds or as copies of Miss Sawyer's illustrations in the insert.

On maps of this hemisphere, or of the world, indicate the areas in which the local species are to be found.

Write to your state agricultural college or State Academy of Science to see if a special bulletin or book is available for use in your area. New Jersey has an excellent bulletin on hawks of the state. Iowa has an instructive book on the birds of prey of the State, and the National Audubon Society publishes an excellent book on our hawks. These are of course mere samplings of a much more abundant literature.

If a vermin campaign is undertaken locally, do what can be done to inform the leaders of the material reported in the insert in this magazine, and, if convenient, report the incident to your agricultural college, to the National Audubon Society, or to the editor of this page.

Make a month by month list of the hawks and owls reported locally and post this prominently on a chart. Compare the abundance of the birds of prey reported with the natural cover available for such destructive mammals as the mice. It is probable that more hawks will be seen during the months when the cover is sparse than when it is luxuriant, and it is well that the northern and southern migrations of the migratory species occur during the months when the birds may be most effective as rodent destroyers. Unfortunately, hunters are in the field on their "vermin" campaigns most commonly during the spring, when the hawks are most abundant and capable of doing the greatest good. If "vermin" campaigns have been held locally, notice in which months they have been emphasized in the past. It is doubtful if many are held during the time when the hunters are engaged in taking game legally. Sometimes, the campaigns may be mere excuses for justifying the presence of men in the field with a gun during a closed season.

If dead or stuffed birds of prey are available for study, compare the size of the eyes of night-flying owls with those of the day-flying hawks. Also compare the shape of the heads of hawks and owls and the nature or firmness of the plumage.

Search through the vocabularies of members of the community for the impressions arising from the use of the words hawk or owl in a compound word of any sort. What connotation, for example, goes with mosquito-hawk, night-hawk, or owl-eyed, and how many assume that the word owl automatically implies wisdom of a sort?

Look at pictures of airplanes used in military operations and compare the general form of bombers, scouting planes and fighters. Look for their counterpart in the birds of prey and notice how the large, slow-flying species are less likely to feed on birds than are the more slender agile species that might compare with the fighters and scouting types of planes. It is highly probable that many of the children will have a better knowledge of the types of airplanes used in the war effort than is possessed by many teachers. The tendency of hawks to soar, and of the more slender-winged species to dodge and dive, finds its counterpart in many plane models as will be readily observed by many youngsters.

If children are interested in planes, let them use this interest to develop an understanding appreciation of the birds of prey since many improvements in planes have

been brought about by using the better-flying birds as suggestions for making better-flying airplanes. And so, whether we seek a lesson in mechanics, in biological balance, in human relations, in prejudice or in appreciation, we can find worthwhile inspiration in the birds of prey. Surely, they should be studied as much as are the dinosaurs, which no one ever saw or ever will see alive, and most certainly they are studied and understood less in our grade and secondary schools. Let us hope that this condition will not long persist. Compare the amount of space devoted to dinosaurs and to hawks in the text or outline that you may be following. What do you honestly think of the wisdom of the space allotment given?

NATURE LORE OF EASTER

(Continued from page 184)

much noise as you are making now."

Dyer's broom is an Old World leguminous shrub bearing yellow flowers and simple leaves. It was formerly grown for the blue coloring matter resembling indigo yielded by its leaves.

Throughout the world various religions declare that salvation can be gained only through pain. The early Christian traditions concerning the crucifixion extended this pain beyond Christ's suffering, making it shared also by inanimate nature. This is shown in the story of the poplar, represented in the Old World by *Populus tremula,* and in America by the American aspen, *Populus tremuloides.* According to the story, it was out of this wood that the cross was made and for that reason it has never ceased to shudder or quake for the part it played in the great tragedy. Its trembling began at the moment when the sacred blood stained its wood. Long stems that narrow at the base allow the rounded leaves of the aspen to flutter in the slightest breeze; hence its name of "quaking aspen."

Tradition says that many flowers died of sorrow on crucifixion night but the jasmine merely folded its leaves and endured its pain. However, when it reopened in the morning it was no longer pink, as it had been before, but had turned pale and was never to show color again. Jasmines are mostly natives of the warmer regions of the Old World. The common white jasmine, *Jasminum officinale,* one of the best known, is native to northern India and Persia. The zambac or Arabian jasmine, *Jasminum sambac,* also has white flowers.

Tradition gives us many stories of the palm that run from the sublime to the ridiculous. During the flight into Egypt, says legend, the Virgin commanded the palm to bend its leaves above the Holy Babe in order that He might have shade. At another time the infant Jesus ordered the palm to bend so the Virgin could pluck the fruit. This it did so willingly that He blessed it, and chose it as a "symbol of salvation for the dying," promising that when He entered Jerusalem in triumph it should be with a palm in His hand. Today we celebrate Palm Sunday in memory of that day.

Correspond?

Margaret Shadbolt, Bennington, Michigan, would like to correspond and exchange specimens with others interested in insects, and living in the South, West and in Canada.

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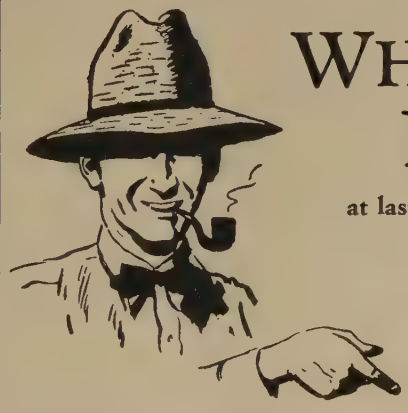

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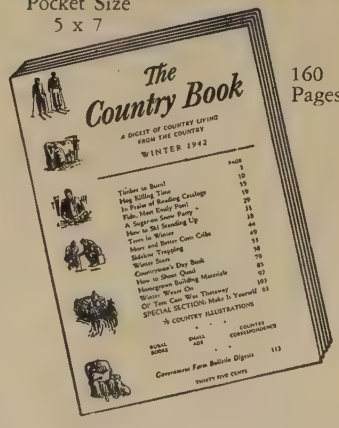

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NATURE IN PRINT

(Continued from page 175)

unsung, perhaps even unbound, and certainly unread, which is worst of all.

I do not know the publishing history of Mr. Parham's book. It is my speculation, however, that perhaps the book has not been sold more successfully because on one hand it may appear to be a Provincial book and, on the other, because it has a diversity of interests and values that can not catch the eye at a glance. Actually it is one of those human-interest books which, like Thoreau's *Walden* or Izaak Walton's *The Compleat Angler,* are enriched by the personal experiences, observations, and meditations of the author. Those who know the Okanagan River valley of British Columbia and its Vaseux Lake beside which Mr. Parham established his pioneer shack and home will, of course, have an added interest in the volume, but the book is in no way dependent on such a local interest. Rather, that valley becomes a typical scene for the life of a man who says, "I wanted unspoilt Nature about me."

Pioneering, ranching, entertaining visitors (including Major Allan Brooks who contributed two drawings to the book), enjoying the companionship of his dog, and observing the wild flowers, birds, and mammals —domestic, wild, and semi-wild like the wandering horses—Mr. Parham has lived a life that abounds in interest and richness, and he has lived it deliberately. *A Nature Lover in British Columbia* is the part of that life that Mr. Parham, as Milton said, has "treasured up for a life beyond life," and it is my hope that it will so live.

The volume's 292 pages included a leisurely narrative of Mr. Parham's experiences; essay chapters on such subjects as "Indians", "Horses—Wild and Otherwise", "Wild Flowers", "Ants and Ant-Lions", "Canada Geese", and "The Search for Truth", forceful and understanding pleas for conservation, in special chapters on "Slayers and The Slain" and "Save the Birds" as well as throughout the volume; and all the aids to understanding that one could wish for—endpaper maps, seventeen photographs, four drawings, an index, and four appendices listing birds, flora, fishes, and mammals.

In four chapters interspersed among the others Mr. Parham tells the story of his dog Banjo, a canine character that will take its place among those others familiar to readers, a character that is indeed seldom out of the author's mind. I am sure that Mr. Parham would have no objections to my concluding this remembrance of his book by selecting as a typical quotation the following paragraph, which seems to touch on many of his interests besides those in this loved and trusted dog, and also to portray faithfully his style of writing:

"Dogs are not, of course, simple products of Nature. We have to thank primitive man, who tamed the wolf or jackal, for giving us these faithful companions; but the country dog is a valuable link with Nature. He bridges a gap, and helps us to understand and appreciate the wild creatures, for, while loving us with a love such as we expect from none save those nearest and dearest to us, his untamed heart still lingers in the haunts of animals as wild as his own savage ancestors. And with the coming of her first spring at Vaseux Lake, Esther [Mr. Parham's sister] roaming the lonely hills in search of horses and cows, with Banjo to lead the way and give her confidence, was fully initiated into the secrets of wild Nature's charms."

On Shade Trees

Our Shade Trees. By Ephraim Porter Felt. New York. 1942. Orange Judd Publishing Company. 316 pages. Illustrated. $2.00.

This is a revised and enlarged edition of the author's earlier book with the same title. One phase of the revision has been entirely to change the chapter on trees and storms, since the experiences of the 1938 hurricane in the northeast shed much light on the relative ability of certain trees to stand such buffeting. Thus the new edition is even more valuable than the original one, which was splendid.

Michigan Lumbering

Michigan Log Marks. Michigan Writer's Project, W.P.A. East Lansing, Michigan. 1942. Michigan Agricultural Experiment Station. 90 pages. Illustrated. 25 cents.

The story of the logging off of Michigan's forest resources is one of boom times, of strong men, and conquest of the wilderness. It is a part of our country's history, and even though it left a wake of ghost towns and desolation it was vital in the building of a nation. There was romance in this, too; romance that is represented by the log marks of the lumber operators. These marks were to the lumbermen what cow brands are to the cattlemen. They show the same originality and variety. In delving back into the past to reconstruct the early days of Michigan logging history, the W.P.A. writers have made a valuable and interesting record.

Blue Ridge Trails

Guide to Paths in the Blue Ridge. Potomac Appalachian Trail Club, Washington, D. C., 1941. Third Edition. $3.50.

It has been interesting to watch the growth of this book from its first edition to the present plump volume with its many maps and excellent descriptions and directions. One feature in the handling of the information is the provision of data for both going and coming over the same trail. This does away with the mental gymnastics necessary in reading trail directions in the reverse. Another wise policy that has been adopted is to prepare the book so that it may be kept up to date year by year by the substitution of pages or maps where geographical changes have been made. This is accomplished by providing, between the stiff covers, a sturdy, looseleaf arrangement. This also permits the hiker to detach that part of the book he wants for a projected trip and slip it in his pocket instead of carrying along the whole book, which is now two inches thick. Each purchaser of the book also receives a map case designed to carry such maps as are needed from the book or to accommodate the Geological Survey maps properly folded. This book is, of course, indispensable to anyone hiking in the Blue Ridge area.

Outstanding Books

Basic Science Education Series. By Bertha Morris Parker. Evanston, Illinois, Row, Peterson and Company. 1941 and 1942. Sixty-five books in series, illustrated in color and black and white. Teacher's Manual.

We have been waiting hopefully for some time for some publisher to have the vision and resources to do what Row, Peterson and Company have done in this series. And even when most hopeful we did not believe that it would be done in a form that would be textually and physically so outstanding.

Each book in this series could be reviewed by itself if space permitted, but we must content ourselves with discussing them collectively. They are designed to fit into any sort of basic science teaching program, and, in so doing, provide something that is new for the science classes of the intermediate grades and junior high school. The texts for the earlier grades, dealing with physical sciences, include such titles as: *The Sky Above Us; Clouds, Rain and Snow; The Air About Us; Fire; Thermometers, Heat and Cold; Stories Read from the Rocks; The Earth a Great Storehouse.* Shortly to come from the presses are *Gravity* and *Magnets;* and titles in course of preparation are *Sound Machines;* and *Water and Its Importance.*

The biological science group for the intermediate grades includes: *Living Things; Seeds and Seed Travels; Flowers, Fruits, Seeds; Trees; The Garden and Its Friends; Reptiles; Fishes; Animals of Yesterday; Birds; Spiders; Insects and Their Ways; Animal Travels.* Being printed are *Toads and Frogs;* and *You as a Machine.* In preparation are *Animals of the Seashore* and *Plant and Animal Partnership.*

For junior high school level the physical science books include: *The Sun and Its Family; The Earth's Nearest Neighbor; Beyond the Solar System; Our Ocean of Air; Fire, Friend and Foe; Light; Ask the Weatherman; The Ways of the Weather; Heat; The Earth's Changing Surface.* In process of preparation are *The Scientist and His Tools;* and *Water Supply.* For junior high school biological science work *Balance in Nature; Insect Friends and Enemies; Insect Societies* and *Life Through the Ages* are now available, while *Soil* is being printed. *The Work of the Body; Keeping Well; Community Health; Man and His Domesticated Plants;* and *Man and His Domesticated Animals* are being prepared.

Miss Parker is the author of the series. She has taught in the science department of the Laboratory School of the University of Chicago for many years. For some of the texts she has sought collaborators who are specialists in the fields covered; for others she has enlisted the cooperation of such specialists for checking scientific accuracy. The teaching manual is based upon her long experience in classroom work in research and in the field of science writing.

Physically the books are beautiful, and inviting not only to any student but to any adult who may pick them up. Color has been liberally used. They would make a perfect addition to any juvenile library despite the fact that they are intended for school use. And we have an idea that father and mother would find it difficult to resist them.

Most of the books are thirty-six pages and sell for twenty-eight cents, list price. There is a discount for quantity orders for schools. Full information may be obtained from the publishers.

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TO THE EDITOR

Children's Museum

Dear Sir:

We have read with interest the article entitled "Exploring a New World" by John Ripley Forbes in the February issue of NATURE MAGAZINE. As the pioneer Children's Museum, we were naturally pleased at this recognition of a movement which we believe to be so vital and important in the lives of our children.

I felt, however, that as an editor and for the sake of the record, you would wish to correct one misstatement. In the third paragraph, Mr. Forbes states that, "Some thirty years ago a far-sighted woman with a love for children set up a museum. It was only one room and a few cases of specimens in an old house in Brooklyn, New York. Skeptics criticised, but in less than a year Miss Anna Billings Gallup made it a huge success." The Brooklyn Children's Museum was opened on December 16, 1899, as a part of the Brooklyn Institute of Arts and Sciences. The idea belonged to Professor William Henry Goodyear, then Curator of Fine Arts at the Brooklyn Museum. The first director was Dr. Ellsworth Call. Miss Gallup came as Dr. Call's assistant in 1902 and was made Curator-in-Chief when he resigned in 1903. The credit for developing the Children's Museum into the fine educational institution which it has become is unquestionably due to Miss Gallup's vision and work. She devoted thirty-five years of her life to the children's museum idea, but I know she, too, would wish to have the facts clarified in any publication.

MRS. WILLIAM LLOYD GARRISON, 3RD.
Brooklyn, N. Y.

In using the phrase "set up a museum" in his article, Mr. Forbes advises us that he had in mind the fact that Miss Gallup was responsible for the present type of progressive children's museum, rather than to convey the information that she founded the Brooklyn Children's Museum. Mr. Forbes was associated with the Children's Museum of Boston and, prior to his induction into the Army, organizer of the Kansas City Children's Museum. He says that he and others in that activity have "always looked to Miss Gallup as the starter of this type of work and museum."—EDITOR.

Sanctuary

Dear Sir:

We have a shelter belt of about five acres north and west of our buildings that is so full of wild flowers we call it "Our Wildwood Garden." Each year we try to add to it by planting or transplanting wild flowers and trees. And since it is protected Nature adds something new each year. Some of the new things are dogwoods, honeysuckles and elderberries for the birds; violets, bloodroot, the fragrant ladies' tresses and many others native to this section. But how I did wish for Indian pipes! If I could only see them in their native habitat just once in my life I would be satisfied. Would Dame Nature ever plant them in our garden? *I* never could.

Sure enough, one day as I strolled through the garden to inspect a few transplants I came upon a cluster of three weak little Indian pipes. They grew on top of a hummock in a rather dry place shaded by a poplar, maple and wild cherry trees, with ferns, wild lilies of the valley and coarse grasses for neighbors. The pipes themselves stood in a brown leaf-mold spot a little bit removed from any plant.

Not satisfied with this one big event, how I did wish to see them just coming up and in the various stages of development. Again Nature seemed to hear my unspoken request and was heedlessly extravagant in her response. I found Indian pipes just coming through the ground and observed them in all stages of growth from July 18 to September 1, when there were still several tall straight pipes in our garden. I found one hundred and nineteen pipes in all. Most of them were only forty or fifty feet from our barn, but on a virgin plot of ground. One pipe was fifteen feet from our driveway. Some grew right in the path where I had tramped many times since early spring. Twenty-two grew in a rubbish-free place beside a patch of wild ginger, where the sun shone for an hour at noon; others pushed up and through masses of sticks and leaves and some had to lift the ripened, prostrate stalk of the tall buttercup or blooming fern. Some pipes grew beneath the shelter of a fallen limb or close to the trunk of a large poplar. In one cluster of five were the old, dried stems of twelve pipes from last year.

There were twenty-one pipes growing near the road. Most of these had pushed through heavy, matted grass, some developed under the grass and one cluster thrived in full exposure to the south sun. A few grew on the shoulder of the road ditch—sophisticated Indian pipes, I'd say, living on a county trunk highway close to telephone wires and the electric line.

What a pretty sight these were! Little white-robed saints of the woodland! Their little heads bowed as in prayer, or, their penance done, their little faces raised straight to the sky for Heaven's blessing.

MRS. STEVE MILLER
Jump River, Wisconsin

WHAT WAS THE ANSWER?

By SAIDEE B. MORSE

Fraternization of different species of animal life always arrests the attention of Nature lovers. Probably much more commingling and cooperation takes place than we have any idea of, but once in a while examples of what we term unusual behavior cause us to wonder anew about the extent of understanding in the lower animals—how far does instinct direct action, and where is the line between instinct and understanding.

A robin and an English sparrow, both adults, induced the foregoing speculation. I was walking across the campus of the state university at Columbia, Missouri, one summer evening. Several robins and a flock of English sparrows were hopping and flying about on the lawn near the walk, but one sparrow was standing off by itself a little way, twittering at rather regular intervals. None of the other birds paid any attention to it until one of the robins stopped his worm hunt on the newly-sprinkled lawn, looked intently at the sparrow, and then went on with his quest. In a few seconds he pulled out a long angleworm, which he immediately took over to the sparrow and popped into its quickly-opened mouth!

Surprised, I watched this performance repeated five times, the sparrow following the robin wherever the latter decided the happiest hunting ground to be, and giving his beggar's plea every few seconds. Only the one robin paid any attention to the sparrow, the others ignored them all; and the sparrows seemed oblivious to the requests, or demands, for food being made by one of their kind.

What was the answer? A clever bird capitalizing upon a one-time accidental feeding by a parent robin when feeding its own brood newly emerged from the nest? A natural beggar among birds as among humans? Was the habit long established or was this the first instance? Was the robin stupid, merely reacting to demands upon its not yet lost seasonal instincts to feed its young, or was it aware of the identity of the sparrow and was it a bird philanthropist? Had it adopted the sparrow as an orphaned youngster, and had the sparrow refused to be pushed out into the cold world, recognizing a good thing when he had it? If so, what was the explanation of the adoption? I have never heard of sparrows laying eggs in the nests of other birds for them to rear their young, as does the cowbird. If that had happened, the answer would be simple. Perhaps the sparrow was unusually observant and had noted the abundant food supply which was no secret to the robins, but which it could not master, so had evolved this plan in order to participate in the feast.

Whatever the explanation, here was the unusual among birds, and though undoubtedly I saw the same robin and sparrow at other times during daily passage on the campus, I never saw this particular bit of cooperation by these species repeated, nor any other kind, for that matter, except tolerance.

Victory Gardening

Gardens for Victory. By Jean-Marie Putnam and Lloyd C. Cosper. New York. 1942. Harcourt, Brace and Company. 222 pages. Charts and garden plans. $2.50.

Instead of a program that inspired people to tear up their front lawns and plant potatoes, as in World War I, the emphasis today is on better nutrition and on efficiency in gardening. This book is, therefore, especially timely. It is also practical advice for the vegetable gardener who approaches this activity as a relative tyro, or who plans to expand his previous efforts in this gardening field. It is apparent that the authors have gotten to work quickly, and have done a concentrated job of writing, to get the book out in early February. On this pressure task they did an excellent and useful piece of writing.

Nature Recreation Camp

Under the direction of Paul W. Nesbit of the University of Colorado the Colorado Nature Camp will hold its third annual session from June 7 to June 21. Space does not permit full details of the program but information may be obtained from Paul W. Nesbit, Box 533, Arvada, Colorado.

TALES OF ANCIENT WHALES

(Continued from page 214)

G. D. Harris, accompanied by the writer and her husband, E. Laurence Palmer, found a vertebra of the ancient whale in eastern Arkansas, near Forrest City. This was the first discovery of the creature in that state. The finding there of the remains of this extinct mammal showed that it swam along the shore when bathing beaches occurred north through Arkansas.

Those who seek to read the past by means of fossils are often asked how they can make the decisions they do. The zeuglodon provides a good example. It is known to have lived in the sea because it bones are found in rocks in which there are also marine shells, like those one may find in the oceans today. The structure of *Basilosaurus* indicates an adaptation to life in water.

Scientists have, by painstaking work, found that this yoked-toothed whale reached a length of 55 to 65 feet; that it had a skull about one-thirteenth its total length; that its neck and chest region were short; its loin area about 36 per cent of the total length and the tail about one-third the length. The vertebrae suggest that the animal was a powerful and speedy swimmer. Other bone formation indicates that the fore part of the body could be reared out of the water. The hind limbs were as useless as those of the modern whale, and the teeth show that the beast was adept at grasping and holding food. It probably preyed on large fish and other ocean dwellers, and its narrow rib cavity indicates that it could not stay long under water.

Whales, dolphins and porpoises belong in the same order of mammals and are known as cetaceans. The zeuglodon was an ancient cetacean. *Basilosaurus cetoides,* with which we are concerned here, was the most mammoth and specialized of all the group. It lived in the southern region of the present United States in the last part of the Eocene time of the earth's history—some forty million years ago. It had relatives of both earlier and later times and in many parts of the world. It was not the ancestor of the modern whales—and it was *not* a lizard.

BABES OF THE WILD

(Continued from page 188)

Several remained, avidly clinging to the ripening heads of husky bull thistles. Their confiding manner encouraged a nearer approach. From fifteen feet I moved forward very slowly to gain the first ten. Minutes inched by. Several linnets joined their comrades among the yellow pines; others retreated over the weed tops. Two stayed on. One, seemingly a young bird, clung to the huge pink-purple blossom topping a tall thistle. There was little to distinguish him save that indefinable something that marks the immature.

Could the distance be lessened to three feet? A dense growth of dry weeds intervened. Shifting weight to one foot, sliding the other slightly ahead among the dead stems, changing balance imperceptibly to it, I edged closer. A yard left and the other linnet, possibly the parent of the young bird in front of me, retired to the old fence.

I could almost touch the little siskin by reaching out my hand. Except for an occasional bright glance up at me, he was still absorbed in the seed that he pulled energetically from the thistle bloom. A border of lavender was left on one side of the ripening head, and the small forager, grasping the seed fluff filling the opening flower bracts, drew out the long seed. Separating it from the down he ate each seed quickly and set to work again on the flower head. Now but fifteen inches separated us.

What should I try next? Sagging from my pocket was the top and yellow bloom of a sunflower. The bird might be touched with the green leaves without taking alarm. More than that the little fellow was not disturbed when the sunflower itself bobbed against him. Then a stealthy finger stole close, partly concealed by the drooping leaves.

How the little siskin relished the thistle seed!

Presently, without the leafy disguise, I was stroking him upon the back, and only for a moment did he appear disconcerted. Quickly he resumed pulling the fluffy seed-parachutes from the thistle blossom, clinging the more tightly to maintain balance. My hand came away and returned to stroke him a bit awkwardly under the chin. Turning his head the pine linnet gave my finger a gentle peck and repeated it before continuing his breakfast.

Twenty minutes had passed and still the siskins perched there in the morning sunshine, one atop the tall stalk of pasture thistle, the other a few feet away upon the fence rail. I lowered my hand over the friendly bird, covering him almost completely. For a few fleeting seconds he paused. I could have seized and held him. Yet who could have betrayed that tender confiding spirit? Slightly startled he darted from between my fingers, and, with his quite impassive parent, bounded up into the fragrant pines.

At the close of their first season of life the young of the wild face one of two great crises: they must either endure the stern rigors of winter, or they must launch on extended migrations that carry them thousands of miles into unknown lands. Each is an epic adventure. Many succumb, never to know the delight of spring's return. Many never view the far, fair lands of the south. But with the new year's returning, the awakening of earth, and the renewal of warmth, all is forgotten, and the story is retold. Again we find in woven cradle or reedy basket, in wood cavity or pebbled depression, those downy young whose untried wings will someday be the bright pinions that give us so much joy.

No Yosemite School

It is with regret that we learn of the decision of the National Park Service to suspend the scheduled session of the Yosemite School of Field Natural History this year. Since its inception in 1925 the school has made a significant contribution to conservation and Nature education through the training that it has given to leaders. In announcing the suspension Newton B. Drury, director of the Service, assigns no reason, but states that he issues the order with reluctance and desires that the program of the school be re-established as soon as possible.

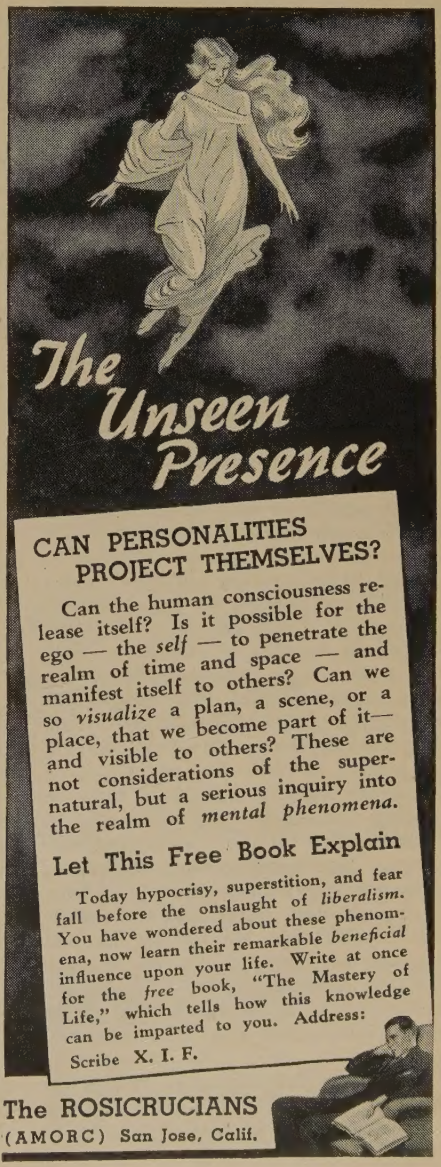
SECOND TEN-YEAR INDEX

With the issue of December, 1942, Nature Magazine will complete twenty years of publication. At the conclusion of the first ten years an index for that period was compiled and printed. This has proved immensely valuable to subscribers, librarians and students. Our readers are asking whether a similar index to the second ten years will be made available.

This depends entirely on our readers

Compilation of such an index is a difficult and tedious task. And its printing involves expensive type composition. For these reasons the production of a second ten-year index involves an expense that cannot be undertaken unless the demand of our readers promises to pay these bare costs.

The only way in which we can find out the demand is to ask. If you would wish this index send us a post card indicating whether you would pay $1.00 for it, or even $1.50 if necessary.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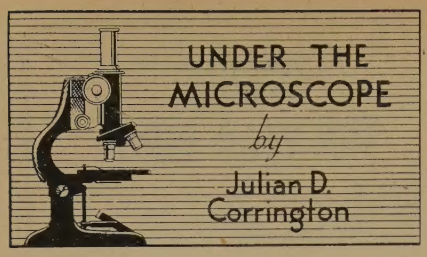


Rotifers

Everyone who has studied the microscopic life of freshwater ponds or who has kept cultures of protozoa has seen numerous examples of rotifers, but few have devoted to them the attention they deserve. Discovered by Leeuwenhoek, rotifers have long been favorites with the serious adult amateur, but are rather uniformly neglected in formal courses in biology, since they constitute a small group of no economic importance. Those who have copies of the older type of book, such as Gosse's *Evenings at the Microscope* or Carpenter's *The Microscope and Its Revelations,* will have noted the prominence given therein to these minute but complex animals.

Most zoologists today rank these "wheel animalcules" as a separate phylum, the Rotifera or Rotatoria. Others use the term Trochelminthes for the rotifers alone or to include also the gastrotrichs, a still smaller and less familiar assemblage. The Rotifera occupy a position higher than flatworms but below segmented worms, and as a group are the smallest of all metazoan animals.

Rotifers average as to size with the larger protozoa, such as amoeba and paramecium, and because of a presence of a crown of cilia on the head, were long thought to be infusoria. However, careful study reveals them as multicellular animals or metazoans, in spite of their minute size, and owners of digestive, excretory, muscular, nervous and reproductive systems. As to general animal characters, they exhibit bilateral symmetry and a complete digestive tube, are triploblastic and unsegmented, have a wide internal cavity that is not a true coelom, an excretory system with flame cells, no circulatory or respiratory system, separate sexes, and internal fertilization.

Conditions as to many of the structures and habits vary widely so that it is difficult to generalize. What might be considered as a typical rotifer possesses a transparent and flexible cuticle; beneath this is an ectoderm in which the cell walls have been lost during development, resulting in a continuous layer of protoplasm with separate nuclei, a condition termed syncytial. Such syncytia are characteristic of the various tissues of the group and comprise one of the most striking and peculiar of their features. Moreover, the number and arrangement of nuclei in any given tissue of the body are constant for any one species—so much so that they actually have been numbered and mapped for certain well known forms. In *Hydatina senta,* for example, there is a total of 958 somatic nuclei, divided into 301 for the skin and associated structures, 167 for the pharynx, 76 for the digestive tract, 43 in the urogenital system, 120 in the muscles, 247 in the nervous system, and 4 in the retrocerebral organ.

Our labeled photomicrograph of this species shows some of the chief anatomical features. Missing or indistinct is the double circle of rapidly-beating cilia on the trochal disc crowning the head. In life, these give the impression of one or a pair of rapidly rotating wheels, from which the name for the phylum was taken. The outer row is termed the cingulum and the inner the trochus; both together, the velum. Details of this structure vary with different species. The mouth lies in a groove between the two circlets and receives minute protozoans and other food particles swept into it by the swift ciliary currents, ceaseless in their work while the animal is active.

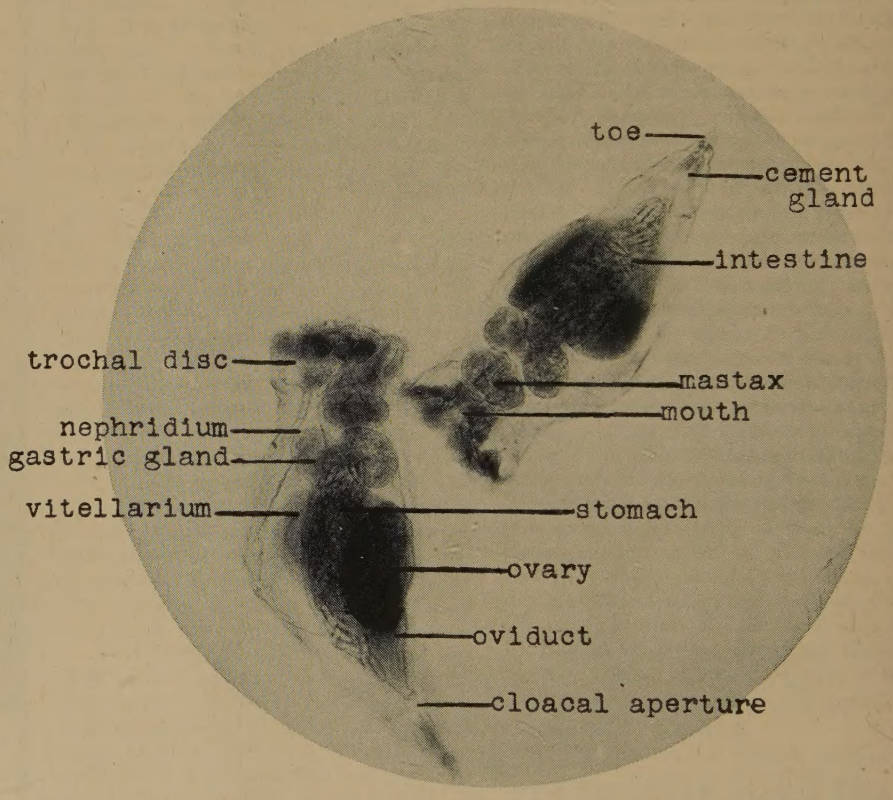
From the mouth a short esophagus leads into the muscular pharynx, also called the mastax or chewing stomach. Here are found chitinous jaws, in continuous motion, and easily seen through the microscope as they work back and forth, breaking up the food. They immediately identify their owner as a rotifer. The jaws, or trophi, differ in size and shape and are used by the taxonomist in separating species. In some rotifers they may be extruded through the mouth, serving as pincers to grasp prey.

Food then continues into a glandular stomach, lined with cilia, and receives digestive enzymes from a pair of gastric glands. Indigestible particles thence pass through an intestine to the cloaca and out through the cloacal aperture, while digested food is absorbed through the wall of the stomach and intestine and reaches all parts of the body by diffusion, no circulatory system being necessary in so small a creature. Oxygen for respiration is taken in through the general body surface and likewise is distributed by diffusion.

On the other hand, an organized excretory system is present, consisting of a pair of excretory tubes or nephridia, that communicate by a cross trunk just in rear of the trochal disc, and that empty into a bladder in rear, which in turn connects with the cloaca. Here and there along the tubes are flame cells which gather the excretions. The bladder pulsates and voids these excretions and, since the amount of water expelled is very large and the quantity taken in by the method of feeding must also be much in excess of needs, the bladder acts as a hydrostatic organ, to rid the body of such extra water, as do the contractile vacuoles of protozoa, and probably a large share of respiration is cared for by this means too, the incoming water being charged with oxygen, the outgoing with carbon dioxide.

Rotifers move about mainly by the action of the ciliary crown, and go shooting rapidly through the water like an infusorian. When one desires to settle down and feed, the foot is attached to the substratum, cement glands in the toes secreting an adhesive substance. From this point of anchorage, the animal protrudes forward or withdraws, sections of the body collapsing upon one another in telescoping fashion. First one direction then another is tried, the wheels all the while revolving with extreme rapidity, setting up currents that play havoc with all small organisms within a wide radius. Some species also progress by the inchworm method, attaching first head and then foot. A few are colonial, attached, or parasitic, and some are marine, but the great majority are free-living, solitary, and freshwater.

Commonly three body regions may be recognized, a head, trunk, and foot, the last usually forked into two, sometimes three toes. The genera *Rotifer* and *Philodina* have the ciliary crown divided into two separate retractile lobes, each with its wheel. Many species have simple eyes and several types have three areas armed with stiff sensory hairs, constituting the single dorsal and two lateral antennae. Just below the dorsal antenna is the brain, but the nervous system is otherwise poorly developed. Muscles occur



HYDATINA SENTA, TWO FEMALES, MAGNIFIED ABOUT 120 TIMES. THE STOMACH AND INTESTINE OF EACH ARE CROWDED WITH DIATOMS

as isolated bands that cross through the body cavity and no continuous sheet of muscular tissue is present.

The reproductive system, as usual, affords some remarkable examples of specialization and adaptation. Reproduction is by the sexual method and the sexes are separate. The female is provided with an ovary (two in some species), in which the eggs are formed, a yolk gland or vitellarium, which furnishes the eggs with yolk, and an oviduct by which they reach the cloaca and thence the exterior. Males are usually small and degenerate and there are many species in which the male has never been discovered and is probably absent, only females existing. In *Hydatina* the small male lacks an alimentary canal and enjoys but a brief life span. The other systems are well developed and there is a single large testis, secreting the sperm cells, and a penis which is protruded through the dorsal cloacal aperture in mating, fertilization being internal. In males of some species the ciliated velum is absent, and in some there is no excretory system. Evidently the male rotifer represents a fast vanishing type of individual.

In a typical life cycle there are two kinds of females. During most of the year there exist only amictic females—those provided with a double set of chromosomes in both body cells and germ cells—which are, as the geneticist terms them, diploid individuals. These produce thin-shelled "summer" eggs that are not fertilized, there being no males in existence to fertilize them, and that develop at once into a second generation of amictic females. This procedure may be repeated many times and is an example of the biological phenomenon termed parthenogenesis (virgin birth)—reproduction without fertilization—occurring also in other groups of animals. In those genera such as *Rotifer*, in which males are unknown, this method of propagation apparently is perpetual and the need for males or fertilization eliminated.

In the majority of rotifers, at some season, mictic females are produced. These get rid of one half of their complement of chromosomes in their egg cells, which accordingly have only one full set of these bearers of hereditary determiners instead of a double set, and are termed haploid. Some of these haploid eggs develop parthenogenetically into males, which proceed to fertilize the mictic females, and thus the resulting fertilized eggs are again diploid and produce amictic females, the "stem mothers," starting the cycle all over again. The fertilized or "winter" eggs have thick shells, often ornamented or sculptured. The thin-shelled summer eggs that develop into males are smaller than those that produce females, and all three classes of eggs may readily be distinguished under the microscope.

Unlike other eggs, the fertilized eggs must undergo a resting period before they can develop, and here the utility of the thick shells becomes apparent, since they protect against periods of drying up of the environment and tide the race over until more favorable conditions of moisture return. However, even adult rotifers of most species can dry out to a mere speck of dust when the small body of water in which they may chance to dwell evaporates. The animal loses most all of its water content and secretes a gelatinous envelope, within which it may live in a dormant condition for months or even years, and be blown about by the wind or transported on the feet of birds, resuming active life once more if carried into water. This power to resist desiccation and endure extremes in temperature is better developed in some rotifers than in any of the protozoa.

Rotifers are collected in the same places and by the same means as protozoa, but because of their ability to withstand drying out, are especially noteworthy in very small amounts of moisture, such as gathers temporarily in mosses, cemetery urns, hollows or ornaments on gateposts, in old and exposed tin cans, in roof gutters, rock crevices, and similar situations. They are abundant in old protozoan cultures and generally mark the declining period of microcosmic infusions, outlasting all other forms. Being easily distributed in the dried condition, many species are worldwide. Localities in South Africa and China that have the same environmental conditions as obtain in Maryland, for example, will have the same species of rotifers.

Of philosophical interest is the fact that rotifers in general and certain species in particular bear a close resemblance to a form of invertebrate larva, the trochophore, occurring in the early embryology of annelids, mollusks, bryozoa (polyzoa), nemertine worms, and possibly still other phyla. This has led to the interesting conclusion that the rotifer represents today the least modified descendant of an earlier common ancestral type for all of these groups, the trochozoon, a microscopic marine animal. Such phyla as the arthropods that are on other grounds obviously related in descent to those named, and that have no trochophore larvae in their life cycles, are supposed to have dropped out this stage during the millions of years in which they have been diverging from the common ancestral type.

Rotifers do not make especially attractive subjects for fixed and stained smear mounts, though such slides are necessary as supplements to live specimens in working out details of structure and development. The technique is similar to that used for protozoa. Narcotizing methods for slowing down movements or killing have been advocated by many investigators, Baker's formula consisting of 3 cc. of a 2% aqueous solution of cocaine hydrochloride, 1 cc. of 90% alcohol, and 6 cc. of distilled water. Add this mixture a few drops at a time to a watch glass containing rotifers in a small amount of their natural water. Continue for 30 minutes, or until the cilia cease beating, then add the fixer. Chloroform, menthol, epsom salts, 1% stovaine or eucain, and many other reagents have also been used successfully as anæsthetics. Possibly one of the simplest and best is a 1% aqueous solution of chloretone.

A hot aqueous saturated solution of corrosive sublimate makes a suitable fixer, as does Bouin's or Zenker's fluids. For fine work a Flemming mixture is preferable. Five to ten minutes is ample, followed by staining, dehydration, clearing and mounting in the usual manner. Many stains or combinations may be used, as gentian violet—orange G, safranin—fast green, eosin—methylen blue, Delafield's hematoxylin—eosin, iron hematoxylin—orange G, acid fuchsin—methyl green, or acid fuchsin—picric acid.

The living rotifer is far more interesting than any permanent slide and hence vital dyes are valuable, as they stain structures without killing the organism. One part of neutral red to 50,000 parts of distilled water is best for this purpose. Methylen blue also may be employed in the same strength, though with less certain results.

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Trade Notes

Digression on scientific philosophical writing: Scientists who become outstanding pass through several phases of development if their lives are spared to the age of dentures, bald heads or hoary locks. As graduate students and internes of their chosen fields they are concerned chiefly with mastery of highly specialized and detailed techniques, facts, theories, and a vast and intricate literature. With experience and practice, they gradually assume leadership in the knowledge, presentation, and interpretation of their specialty and its place in their immediate science.

Thus an undergraduate student begins by surveying the elements of biology, chemistry and physics, then concentrates on, say, biology as a graduate student, stressing, for example, physiology. Specializing still further, he becomes known as a promising young investigator of nutrition, with papers on vitamins that command attention at national meetings. If his vigor and interests continue to motivate more and more important undertakings, he grows into an outstanding leader in nutrition and is soon styled a physiologist.

With maturity and ability to correlate separate specialties, he will later be known as a leading biologist. Thus, after a lifetime of intensive and devoted work, he ends as he began, a biologist, a student of life, but with the difference that now he is a master craftsman instead of a novitiate. Only through specializing can he learn to generalize. Finally, in mellow years, he becomes a philosopher and, relieved from at least most of the onerous parts of undergraduate teaching, puts the fruit of a lifetime of work and thought into writings that synthesize his own contributions with those of others and his own field with related ones, all bearing on general topics of human civilization.

Thus the literature of the world is enriched with essays comprehensive in scope, authoritative in fact, and important in findings and conclusions. Few who begin this long and difficult road reach the broad heights of a cosmic outlook or acquire the ability to impart their matured wisdom in writings having any seasoned literary merit. This month we wish to present to our readers two very important works of this class.

Professor James G. Needham, one of the celebrated Old Guard of naturalists and biologists at Cornell University, has written many papers and volumes on general biology, entomology and ecology. In his latest work, *About Ourselves,* he brings to bear a lifetime of teaching, study, and investigation, and tells in simple language his views about man as an animal and mankind as a society. With rare skill at separating broad fact from mazes of conflicting or confusing detail, and unusual ability in boiling down the findings of whole sciences to main essentials, the author shows more than ever before his skill as a scientist and craft as a writer. The work, with the subtitle *A Survey of Human Nature From the Zoological Viewpoint,* is divided into two parts, Man in his Biological Aspects, and Society in its Biological Aspects. The first part covers the place of man among other animals, the evolutionary progress of the species, the development of the brain and behavior, instincts, and methods of learning. These ten chapters are along the general line of similar treatment by many other authors, yet are refreshingly different. Dr. Needham is a master at story-telling and uses anecdote and humor along with nontechnical language to present brief, convincing, interesting accounts.

The second part goes into discussions of population, social nurture and behavior, social instincts and folkways, and considers war, government, and religion in their biological aspects. These ten chapters contain a great deal of original material that should be read by everyone, and especially by those having to do with sociology, psychology, and government. The book can be read by the junior and senior in high school and all those beyond such years. It presupposes no biological knowledge, yet will delight the professional biologist as well as all other serious thinkers. It is the clearest, simplest, and best organized account of mankind we have seen and is admirably illustrated by Dr. William D. Sargent and presented in most pleasing and readable format by the publisher. Pp. xi, 276; 43 illustrations. The Jacques Cattell Press, Lancaster, Pa., 1941. $3.00.

Sir Charles Sherrington, Nobel Prize winner in medicine in 1932, distinguished British physiologist, author and lecturer, has, after a long life of busy scientific interests and achievements, tackled that most difficult of all problems, an understanding of the nature and meaning of life, particularly of human life and of mind. *Man on his Nature* is a marvelous summation of all that is known by modern science as to this vast topic, and admirably synthesizes the current viewpoints of physics, chemistry, biology, psychology and philosophy.

In order to make his exposition more compelling through the use of contrast, the author gives us a picture throughout the several chapters of the opinions held by Jean Fernel, French physician, scientist, and philosopher of the mid-sixteenth century, then compares Fernel's ideology with that of today. The immense progress of human knowledge in the last four hundred years is thus brought forth in striking and interesting manner. While dealing at times with metaphysical material, there is never any compromise with scientific truth and the conclusions are those of authoritative science, as they could not be in Fernel's day.

The body in its anatomical and physiological details, the physical basis of the mind, the coming into being of the human body and mind, both developmentally and phyllogenetically, and body and mind from the standpoint of chemical energy systems and from the physicist's atomic explanations are dealt with intimately and with many illuminating instances. Contributions from such widely diverse fields as astronomy, parasitology, genetics and ethics are shaken up into the melting pot of knowledge by a writer broad in skill and background, then poured forth in refreshingly new and brilliant molds.

This book is strictly for that audience dubbed the intelligentsia. Some of the going is tough and the language at times difficult. But those who can read the great philosophers profitably have a treat in store for them in Sherrington. Pp. vii, 413; plts. 7, figs. 5. The Macmillan Co., 60 Fifth Ave., New York City, 1941. $3.75. A preliminary account of this volume was given in our issue for November, 1941.

After quite a lapse we again have some literature to distribute. Through the courtesy of the General Biological Supply House, Inc., 761-763 E. 69th Pl., Chicago, we will be able to mail to those of our readers who request them, and enclose a 3c stamp to cover mailing, one each of Turtox Leaflets 5, 6 and 8. The titles of these illustrated leaflets are: #5, "Starting and Maintaining a Balanced Fresh-Water Aquarium," #6, "Growing Fresh-Water Algae in the Laboratory," and #8, "How to Prepare Microscope Slides of Simple Objects." These titles need no amplification. We may add that they are clear, concise, and tell one exactly what to do to accomplish the stated project. Send to Dr. Julian D. Corrington, *Nature Magazine,* 1214 Sixteenth St., N.W., Washington, D. C.

Mavor's *General Biology* is one of our favorite texts, and hence we anticipated the new second edition with interest. The changes made have been numerous and, as far as revision is concerned, are excellent. We do not agree, however, with the author or publishers, as to the desirability or presumed accomplishments of the very extensive reorganization of the material. The volume is much larger and heavier to no good purpose, in our opinion, and frankly we would rather use the first edition in teaching than the present one. As stated in the announcement, "the methodological and historical approach of the first edition has been largely replaced by an ecological and systematic approach in the first three chapters," and we believe the change is unwise and definitely inferior, resulting in a confusing mass of detail, interesting enough, but out of place in the introductory section. The result is considerable repetition farther on, with frequent reference backward that makes for dullness. The ecological chapter, very important and well done, belongs toward the rear of the volume, in the section on principles.

In spite of these criticisms, however, we still regard Mavor's work as one of the best-written and best-balanced general biology texts in the English language. It is thoroughly up to date, and many excellent new illustrations have been added. The amount of blank margin on most pages is excessive, doubtless adding many pages to an already weighty book, but otherwise the format is modern and pleasing, and the binding a decided improvement. Pp. xxx, 897; figs. 490. The Macmillan Co., 60 Fifth Ave., New York, N. Y., 1941. $4.00.

Nature Study is the keynote of the February issue of *The American Biology Teacher,* including nine articles by teachers in service and a longer feature on "The Biology of the Stream" by John Breukelman. Dr. Oscar Riddle continues his analysis of the "Amount and Nature of Biology Teaching in Secondary Schools: Data from a Questionnaire." This journal is the official publication of The National Association of Biology Teachers, with which our A.S.A.M. is affiliated. Membership, including subscription, is but $1.00 per year; applications should be addressed to P. K. Houdek, Secretary-Treasurer, Robinson, Ill.

With the enrollment in the A.S.A.M. of Robert E. Thompson, of McComb, Mississippi, the Society invaded the only state in the east not heretofore represented by at least one member. There now remain only North Dakota, Montana, Wyoming, and Nevada. Who will be member number one in each of these four?